TISTRY
RARY
2

PROPERTY OF
DENTAL LIBRARY
MAY 31 1948

THE Journal OF THE

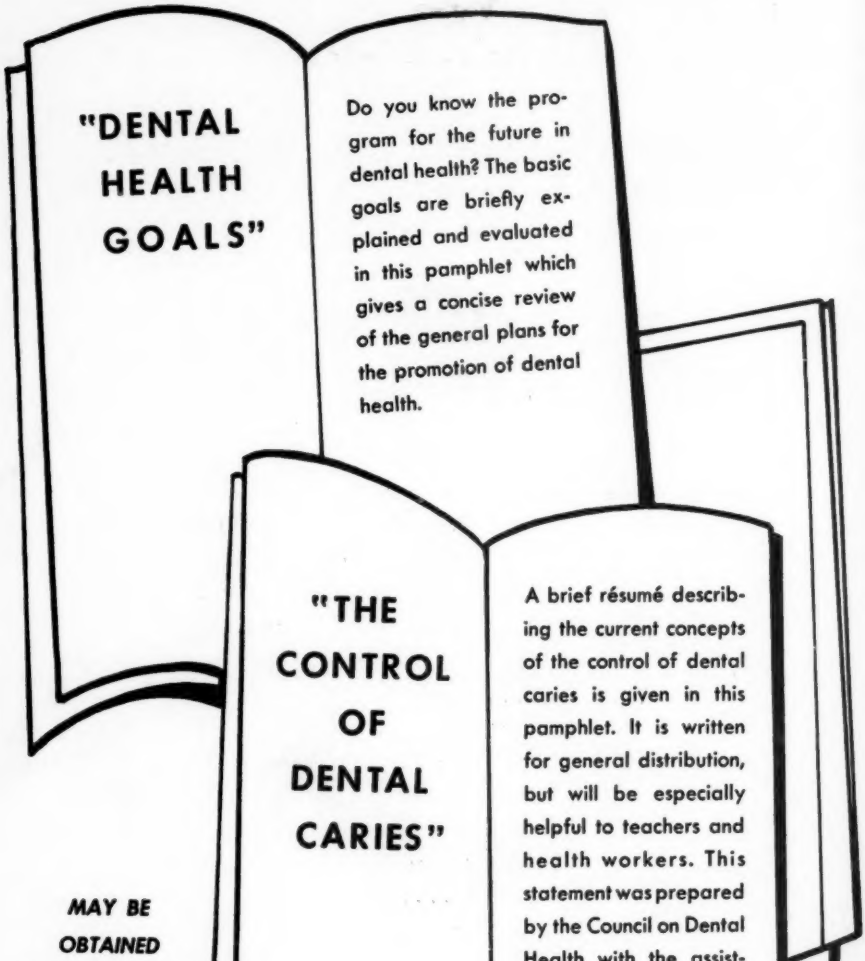
AMERICAN DENTAL ASSOCIATION

JUNE 1948 • VOLUME 36 • NUMBER 5

# CONTENTS

**Demonstration of Alkaline Phosphatase**....*Greep*....427
**Accidentally Fluorinated Water: I**.....*Klein*....443
**Balanced Occlusion**.....*Nebraska Study Club*....454
**Laboratory Craft and Dental Profession**.....*Ward*....460
**Evaluating Dental Resources**.....*Bagdonas*....472
**Medical-Dental Relations**....*R. I. Joint Committee*....482
**Editorials**.....487
**Council on Dental Education**.....491
**Harvard School of Dental Medicine Survey**.....495
**Council on Dental Therapeutics**.....500
**Dentifrices: Questions and Answers**.....502
**Second National Health Assembly**.....507
**News of Dentistry**.....512
**International Correspondence**.....527
**Book Reviews**.....530
**Current Literature**.....534
**Army Dental Corps Separations**.....538
**Deaths**.....541
**Directory**.....544
**Announcements**.....546

# NEW PAMPHLETS


"DENTAL HEALTH GOALS"
Do you know the program for the future in dental health? The basic goals are briefly explained and evaluated in this pamphlet which gives a concise review of the general plans for the promotion of dental health.
"THE CONTROL OF DENTAL CARIES"
A brief résumé describing the current concepts of the control of dental caries is given in this pamphlet. It is written for general distribution, but will be especially helpful to teachers and health workers. This statement was prepared by the Council on Dental Health with the assistance of authorities in the field of dental health.

***MAY BE OBTAINED WITHOUT COST IN LIMITED QUANTITIES FROM:***

**AMERICAN DENTAL ASSOCIATION**
**222 E. SUPERIOR ST. CHICAGO, ILL.**

The Journal of the American Dental Association, Vol. 36, No. 5. Published by the American Dental Association, 222 E. Superior St., Chicago 11, Ill. Yearly subscription $7.00 for U. S. and possessions; $8.00 for foreign countries. Single copy seventy-five cents. Entered as second-class matter, December 31, 1947, at the postoffice at Chicago, Ill., under the act of March 3, 1879. Published monthly. Copyright 1948 by the American Dental Association. The Journal of the American Dental Association is indexed in the Index to Dental Literature and, in part, in the Quarterly Cumulative Index Medicus, Biological Abstracts and Chemical Abstracts.

THE Journal OF THE
AMERICAN DENTAL ASSOCIATION

JUNE 1948 • VOLUME 36 • NUMBER 5

# ALKALINE PHOSPHATASE IN ODONTOGENESIS AND OSTEOGENESIS AND ITS HISTOCHEMICAL DEMONSTRATION AFTER DEMINERALIZATION

Roy O. Greep, Ph.D.; Clary J. Fischer, Ph.D., and Anna Morse, M.S., Boston

In recent years an extensive survey of the distribution of alkaline phosphatase in the soft tissues of the body has been made using the method devised by Gomori[1] and Takamatsu[2] for the histochemical demonstration of this enzyme. Although alkaline phosphatase is distributed widely it is by no means ubiquitous; there is notably little in the striated muscles,[3] the loose connective tissue and permanent hyaline cartilage.

On the other hand, little information has been obtained with respect to the hard tissues because the conventional decalcifying procedures have all resulted in complete destruction of this enzyme. The developing bones and teeth of fetuses and very young animals have been sectioned with fair success without being demineralized, and the location of the enzyme has been determined in these structures during the initiation of mineral apposition.[4-6] In a recent note Lorch[7] stated that she had been able to demonstrate alkaline phosphatase in decalcified bone fragments. A method for accomplishing the demineralization of the teeth and bones of month old rats without destroying alkaline phosphatase was described by Greep, Fischer and Morse.[8] This procedure was based on the use of buffered decalcifying solution having a pH of 4.8 to 5 and reactivation

From the Harvard School of Dental Medicine.

This investigaton was aided in part by a grant from the American Cancer Society on the recommendation of the committee on growth of the National Research Council.

1. Gomori, G., Microtechnical Demonstration of Phosphatase in Tissue Sections. *Proc. Soc. Exper. Biol. & Med.* 42:23 (October) 1939.
2. Takamatsu, H., Histologische und biochemische Studien uber die Phosphatase; histochemische Untersuchungsmethodik der Phosphatase und deren Verteilung in verschiedenen Organen und Geweben. *Tr. Soc. path. jap.* 29:492 (1939).
3. Dempsey, E. W.; Wislocki, G. B., and Singer, M., Some Observations on the Chemical Cytology of Striated Muscle. *Anat. Rec.* 96:221 (November) 1946.
4. Kabat, E. A., and Furth, J., A Histochemical Study of the Distribution of Alkaline Phosphatase in Various Normal and Neoplastic Tissues. *Am. J. Path.* 17:303 (May) 1941.
5. Engel, M. B., and Furuta, W., Histochemical Studies of Phosphatase Distribution in Developing Teeth of Albino Rat. *Proc. Soc. Exper. Biol. & Med.* 50:5 (May) 1942.
6. Morse, A., and Greep, R. O., The Distribution of Alkaline Phosphatase in the Developing Teeth of the 4-Day Rat. *Anat. Rec.* 97:357 (March) 1947.
7. Lorch, I. J., Demonstration of Phosphatase in Decalcified Bone. *Nature* 158:269 (August 24) 1946.
8. Greep, R. O.; Fischer, C. J., and Morse, A., Histochemical Demonstration of Alkaline Phosphatase in Decalcified Dental and Osseous Tissues. *Science* 105:666 (June 27) 1947.

Table 1.—Composition of decalcifying solutions

| Solution | Acid | Per cent | cc. | | Sodium salt | Per cent | cc. | Final pH |
|---|---|---|---|---|---|---|---|---|
| 1 | Sulfosalicylic | 8 | 500 | + | citrate | 20 | 500 | 4.82 |
| 12 | Sulfosalicylic | 10 | 400 | + | citrate | 20 | 500 | 4.74 |
| 2 | Sulfosalicylic | 2 | 300 | + | tartrate | 23 | 600 | 4.70 |
| 3 | Sulfosalicylic | 2 | 100 | + | salicylate | 16 | 1,000 | 4.86 |
| 4 | Sulfosalicylic | 8 | 90 | + | lactate | 10 | 600 | 4.78 |
| 5 | Formic | 2 | 500 | + | citrate | 20 | 500 | 4.95 |
| PIL | Formic | 5 | 500 | + | citrate | 20 | 500 | 4.26 |
| 6 | Formic | 0.5 | 400 | + | tartrate | 23 | 600 | 4.80 |
| 7 | Formic | 0.5 | 120 | + | salicylate | 16 | 1,000 | 4.90 |
| 8 | Formic | 2 | 100 | + | lactate | 10 | 600 | 4.90 |
| 10 | Trichloracetic | 9.8 | 500 | + | citrate | 20 | 500 | 4.84 |
| 9 | Trichloracetic | 1.6 | 300 | + | tartrate | 23 | 500 | 4.82 |
| 11 | Trichloracetic | 9.8 | 100 | + | lactate | 10 | 700 | 4.84 |
| 14 | Acetic | 4.6 | 500 | + | citrate | 20 | 500 | 4.90 |
| 13 | Acetic | 0.9 | 300 | + | tartrate | 23 | 400 | 4.80 |
| 16 | Acetic | 2.3 | 100 | + | salicylate | 25 | 500 | 4.79 |
| 15 | Acetic | 4.6 | 100 | + | lactate | 10 | 600 | 4.84 |
| | | | | | Ammonium salt | | | |
| P3L | Citric | 15 | 100 | + | citrate | 5 | 1,000 | 4.2 |
| P3R | —— | — | —— | — | citrate | 5 | 500 | 4.8 |
| P2L | Tartaric | 5 | 50 | + | tartrate | 5 | 500 | 4.25 |
| P2R | Tartaric | 5 | 25 | + | tartrate | 5 | 500 | 4.78 |
| P4L | Salicylic | 5 | 500 | + | $NH_4OH$ | * | 50 | 4.14 |
| P4R | Salicylic | 5 | 500 | + | $NH_4OH$ | * | 60 | 4.95 |

*116 cc. ammonia water (29.4 per cent) made up to 1 liter with distilled water.

of the phosphatase in an alkaline medium. It is the purpose of this report to give a more extensive account of our investigations of this problem and to describe the distribution of alkaline phosphatase in these hard tissues.

## Materials and Procedures

Most of the decalcifying solutions were made by mixing aqueous solutions of organic acids with those of sodium salts of weak acids (Table 1). The salt solutions served both to adjust the pH and to buffer the solutions. In some instances it was necessary to use a few drops of tenth-normal hydrochloric acid or tenth-normal sodium hydroxide to bring the final pH to the desired value. The pH of the decalcifying fluids ranged from 4.25 to 4.95. All pH measurements were made with a glass electrode.

The materials used for decalcification consisted of the heads of 28 day old rats and the proximal half of the tibias. The heads were split in the midsagittal plane. The tissues were fixed in cold (12 C.) 80 per cent alcohol[9] for forty-eight hours, transferred directly to decalcifying solutions and kept at room temperature. The fluids were changed twice daily using

9. Deane, H. W., and Dempsey, E. W., The Localization of Phosphatases in the Golgi Region of the Intestinal and Other Epithelial Cells. *Anat. Rec.* 93:401 (December) 1945.

approximately 50 cc. each time. The progress of the demineralization was followed daily by means of the "needle test," and when the decalcification was completed, the tissues were immediately dehydrated in a series of alcohols buffered at pH 9.4 at icebox temperature, embedded in paraffin and sectioned at 7 microns.

The alcoholic solutions were made up as follows:

80 cc. of 50 per cent ethyl alcohol plus 20 cc. of 2 per cent sodium diethylbarbiturate.

80 cc. of 80 per cent ethyl alcohol plus 20 cc. of 2 per cent sodium diethylbarbiturate.

80 cc. of 95 per cent ethyl alcohol plus 20 cc. of 2 per cent sodium diethylbarbiturate.

50 cc. of 95 per cent ethyl alcohol plus 50 cc. n-butyl alcohol plus 0.4 Gm. sodium diethylbarbiturate.

100 cc. n-butyl alcohol plus 0.4 Gm. sodium diethylbarbiturate.

These reagents were combined and let stand, with occasional shaking, for one or more days. The alcohol then was filtered and adjusted to the desired final pH by the addition of a drop or two of alkali.

The tissues were kept in glass-stoppered containers during fixation, decalcification and dehydration and at icebox temperature except during decalcification.

The mounted sections were placed in a desiccator over calcium chloride and kept under refrigeration until used. The following day a selected number of slides were deparaffinized, coated with 1 per cent colloidin, hydrated and transferred directly to reactivating solution consisting of 0.4 per cent aqueous sodium diethylbarbiturate adjusted to pH 9.4 ± 0.1. The reactivation was carried out at icebox temperature. Twenty-four hours later other slides (24 hr. reactivation, Table 2) of the same tissues were removed from the desiccator, deparaffined and placed in the reactivating solution. After an additional twenty-four hours all these slides, along with others which had not been treated with reactivating solution (zero hour, Table 2) were incubated simultaneously for three hours at 37 C. in a substrate mixture containing sodium glycerophosphate (Eastman Kodak Co.). Consequently, from each block of tissue sections were incubated with glycerophosphate after zero, twenty-four and forty-eight hours of reactivation.

Control sections were treated in the manner just described except that they were incubated separately with no glycerophosphate in the substrate mixture. Furthermore for each of the above slides there was a duplicate which was treated in identical fashion except that during incubation magnesium chloride was added to the substrate mixture to a final concentration of 0.0015 molar. Since we were to compare the phosphatase activity as demonstrated on several slides from a given block, wherever it was permissible these slides were immersed simultaneously in a given reagent and removed in like manner to insure uniformity of treatment.

The substrate mixture was that proposed by Gomori[10] except that whenever magnesium ions were to be supplied we used magnesium chloride instead of magnesium sulfate.

In a few instances, as noted in Table 2, phosphatase was reactivated by allowing the slides to stand twenty-four hours in a $2.5 \times 10^{-3}$ molar glycine solution buffered at pH 9.4±0.1 with sodium diethylbarbiturate.

During incubation the phosphate ions which are split off from the glycerophosphate unite with calcium ions supplied in the substrate by calcium chloride and thus are trapped at the site of phosphatase activity in the form of an insoluble precipitate of tricalcium phosphate which is barely visible. After incubation the visualization of this precipitate, as worked out by Gomori,[1] involves treating the sections with cobaltous nitrate which converts the calcium phosphate to

10. Gomori, G., Calcification and Phosphatase. *Am. J. Path.* 19:197 (March) 1943.

Table 2

| Decalcifying solution | | | Decalcifying time (days) | | Over-all phosphatase reaction (0 to 5) in incisors | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Zero hour | | 24 hr. reaction | | 48 hr. reaction | | 24 hr. glycine | |
| Acid | Base | pH | incisor | tibia | O Mg | Mg | O Mg | Mg | O Mg | Mg | O Mg | Mg |
| Formic | Na citrate | 4.95 | 2 | — | 2½ | 3½ | 3½ | 4½ | — | — | 3 | 3½ |
| Formic | Na citrate | 4.26 | 1 | — | 0 | 0 | 0 | 0 | — | — | 0 | 0 |
| Tartaric | $NH_4$ tartrate | 4.78 | * | — | — | — | - | — | — | — | — | — |
| Tartaric | $NH_4$ tartrate | 4.25 | * | — | — | — | — | — | — | — | — | — |
| (None) | $NH_4$ citrate | 4.8 | 2 | — | 2 | 2½ | 3 | 4 | — | — | 3 | 3 |
| Citric | $NH_4$ citrate | 4.2 | 2 | — | 0 | 0 | 0 | 0 | — | — | 0 | 0 |
| Salicylic | $NH_4OH$ | 4.95 | 33 | — | 0 | 0 | 0 | 0 | — | — | 0 | 0 |
| Salicylic | $NH_4OH$ | 4.14 | 33 | — | 0 | 0 | 0 | 0 | — | — | 0 | 0 |
| Formic | Na citrate | 4.95 | 2 | 2 | 1½ | 1½ | 3 | 4 | 3 | 4 | — | — |
| Formic | Na tartrate | 4.80 | * | — | — | — | — | — | — | — | — | — |
| Formic | Na salicylate | 4.90 | * | — | — | — | — | — | — | — | — | — |
| Formic | Na lactate | 4.90 | 4 | 4 | 1½ | 1½ | 3 | 4 | 3 | 4 | — | — |
| Sulfosalicylic | Na citrate | 4.82 | 3 | 3 | ½ | 1 | 1½ | 2 | 1½ | 2 | — | — |
| Sulfosalicylic | Na citrate | 4.74 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | — | — |
| Sulfosalicylic | Na tartrate | 4.70 | * | — | — | — | — | — | — | — | — | — |
| Sulfosalicylic | Na salicylate | 4.86 | 12 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | — | — |
| Sulfosalicylic | Na lactate | 4.78 | 3 | 2 | 2 | 3 | 4 | 5 | 4½ | 4½ | — | — |
| Tirchloracetic | Na citrate | 4.84 | 6 | 6 | 0 | 0 | ½ | 0 | 0 | 0 | — | — |
| Trichloracetic | Na tartrate | 4.82 | * | — | — | — | — | — | — | — | — | — |
| Trichloracetic | Na lactate | 4.84 | 5 | 5 | ½ | 1 | 2 | 1½ | 2 | 1½ | — | — |
| Acetic | Na citrate | 4.90 | 3 | 2 | ½ | 1 | 1½ | 2½ | 1½ | 2 | — | — |
| Acetic | Na tartrate | 4.80 | * | — | — | — | — | — | — | — | — | — |
| Acetic | Na salicylate | 4.79 | 12 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | — | — |
| Acetic | Na lactate | 4.84 | 3 | 3 | 1 | 1½ | 2 | 3 | 2 | 2½ | — | — |

*Failed to demineralize.

cobalt phosphate, and then immersing them in ammonium sulfide which changes the cobalt phosphate to black cobalt sulfide. This black precipitate indicates the presence of phosphatase (barring, of course, the presence of any calcium phosphate other than that formed through enzymatic action) and denotes its location. Moreover the density of this precipitate is of value in estimating histochemically the relative concentration of phosphatase in different foci.

The phosphatase activity as demonstrated in sections of decalcified tissue was gaged by inspection of the density of the black cobalt sulfide deposit with the naked eye or at low magnification. The slides were given a rating based on a scale of 0 to plus 5. Reference slides were selected to illustrate each of these grades of activity and were used as standards in making the estimation of activity. After we had gained considerable experience in making these ratings of the whole sections and found that the estimates made by different individuals were remarkably similar, half units were introduced to include sections wherein the activity seemed definitely to fall between two of the original five standards.

## Results

Twenty-three different fluids were tested with respect to their ability to remove the mineral salts from the bones and teeth and their effect on the activity of alkaline phosphatase. The composition of each of these solutions, the pH, and the length of time which was required to complete the decalcification are shown in Table 2. The solutions which failed to cause any appreciable softening of the hard structures within ten to fourteen days are indicated. It will be noted that in six out of seven instances where solution of the mineral did not occur, the fluid contained sodium or ammonium tartrate. The other failure was with a combination of formic acid and sodium salicylate. The pH of these particular fluids ranged from 4.25 to 4.90.

The mineral was removed completely from the teeth and bones by sixteen of the decalcifying fluids. This required one to twelve days except for the two solutions made up of salicylic acid plus ammonium hydroxide which required thirty-three days.

An inspection of the estimated enzyme activity as shown in Table 2 reveals that in every instance where the phosphatase was in contact with these acidic mediums for six or more days, the activity was lost completely and irreversibly. Furthermore, the instances of good preservation of phosphatase activity were associated always with the shorter decalcification periods. It is for this reason that we have followed carefully the progress of the softening process in order that the tissues would not remain in acid mediums longer than was necessary to complete the decalcification. The duration of exposure to acid was not the sole critical factor in regard to preservation of phosphatase activity. It will be noted that different decalcifying solutions which required the same length of time for decalcification may show an extreme difference in their effect on phosphatase.

The pH of the decalcifying fluid is of paramount importance in determining whether the enzyme will be inactivated or not. The lowest pH which has so far permitted demineralization with recovery of phosphatase is 4.78. The importance of the pH factor is emphasized by the fact that sulfosalicylic acid buffered with sodium citrate at pH 4.74 caused complete inactivation of the enzyme whereas at pH 4.82 some phosphatase activity was retained and this was capable of being reactivated.

On further analysis of the data it is possible to weigh the relative influence of the acid as against the salt in these

fluids on the subsequent reactivity of the phosphatase. The kind of salt used is clearly of more importance than the kind of acid. The tartrate solution as used did not bring about decalcification irrespective of pH or the kind of acid with which it was combined. Also, with salicylate-containing fluids decalcification either failed or was prolonged, with no phosphatase being recovered. The poor results with these solutions may be due partly to the fact that it was necessary to use a low concentration of acid in order to avoid excessive concentrations of the sodium salts. On the other hand all but one of the solutions which contained either lactate or citrate permitted satisfactory preservation of phosphatase when the pH was within the previously established favorable range, that is, 4.8 to 5. The one exception to be noted occurred with sodium citrate and trichloracetic acid. A comparison of the effectiveness of the different kinds of acids employed in the decalcifying mediums shows that less phosphatase is retained after treatment with trichloracetic acid than with formic, acetic or sulfosalicylic acid.

In summary we find that within the pH range of 4.8 to 5, decalcification can be accomplished without destroying phosphatase. Good results were obtained with formic acid or sulfosalicylic acid buffered with sodium citrate or sodium lactate and with 5 per cent ammonium citrate. Fair results were obtained with acetic acid buffered with sodium lactate.

### Reactivation

We estimated the phosphatase activity after zero, twenty-four and forty-eight hours of reactivation in alkaline mediums (pH 9.35), and further, in each instance the activity was ascertained with and without magnesium ions in the substrate mixture. In order to clarify our use of these procedures it is necessary to point out that in a previous study of the activity of alkaline phosphatase *in vitro* it was found that the enzyme rapidly lost its hydrolytic activity on standing in an aqueous medium of neutral or slightly acid reaction.[11] The activity was partially restored by standing at room temperature for twenty-four hours in an aqueous medium buffered at about pH 9.4. By observing the effect of a number of other substances, including inorganic ions and amino acids, on phosphatase samples of widely differing hydrolytic potency, information was obtained relative to the reversibility of phosphatase inactivation. This led to our use of buffered alkaline solution, magnesium ions and glycine under the conditions described here for the histochemical reactivation of phosphatase after decalcification.

An inspection of the estimated phosphatase activity under the column headed "zero hour" in Table 2 shows that in the absence of any reactivation, very little phosphatase activity was present. It will be noted, however, that by placing the sections in buffered alkaline medium for twenty-four hours, the activity invariably was increased, sometimes greatly and in other instances only moderately. In only one instance were we able to recover activity by this means from tissues which at zero hour had shown no detectable phosphatase activity. Also in confirmation of the *in vitro* study of phosphatase mentioned before, it was found that the reactivation was completed within twenty-four hours. The phosphatase activity was not improved in any instance by reactivation for an additional twenty-four hours.

Knowing that the decalcifying fluids used here all have a significant inactivating effect on phosphatase, we were interested to know in the first place how extensive this might be and secondly

11. Fischer, C. J., and Greep, R. O., Studies on Activation of Purified Alkaline Phosphatase. *Arch. of Biochem.* 16:199 (February) 1948.

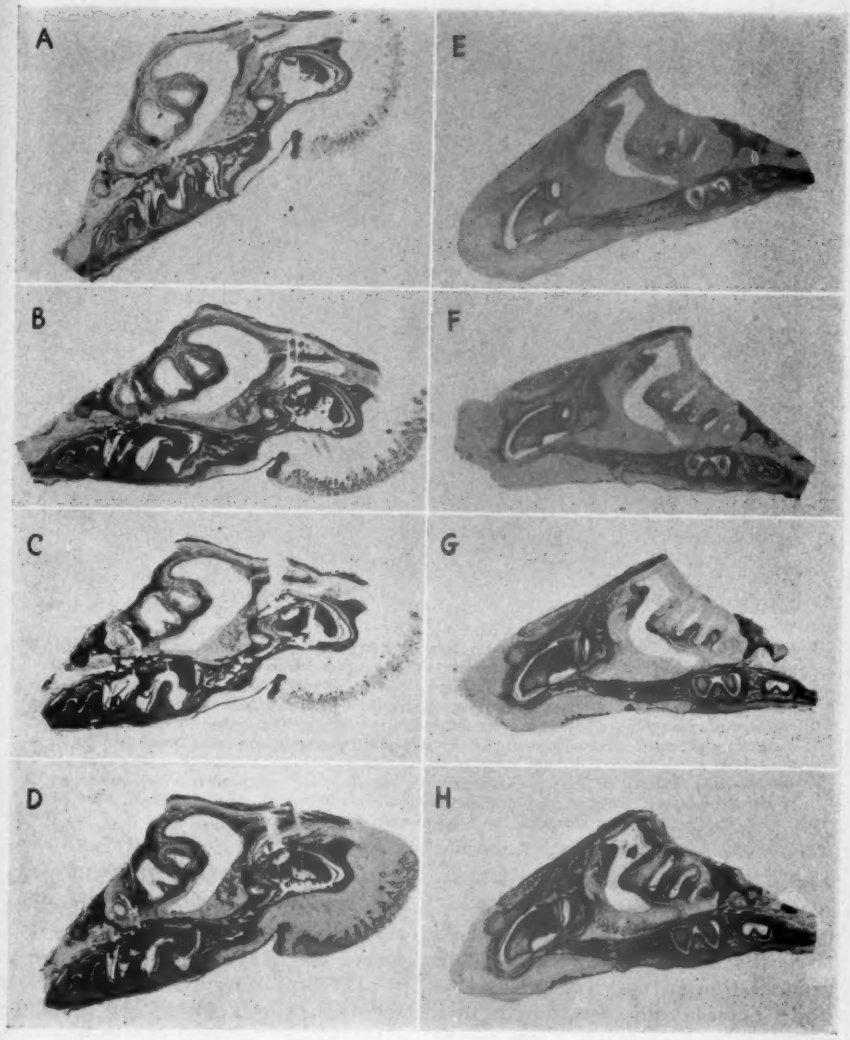



*Fig. 1.—Parasagittal sections from head of four day rat. Sections A through D are from the right half-head which was not decalcified and E through H are from the opposite half-head which was decalcified in formic acid buffered with sodium citrate at pH 4.89. Sections C, D, G and H were reactivated for twenty-four hours in an alkaline buffered solution; A, B, E and F were not reactivated. Although all the sections were incubated with glycerophosphate for three hours at pH 9.5, magnesium was added to the substrate mixture during incubation of only sections B, F, D and H. A.—Undecalcified, zero hour reactivation, no Mg. B.—Undecalcified, zero hour reactivation, plus Mg. C.—Undecalcified, twenty-four hour activation, no Mg. D.—Undecalcified, twenty-four hour reactivation, plus Mg. E.—Decalcified, zero hour reactivation, no Mg. F.—Decalcified, zero hour reactivation, plus Mg. G.—Decalcified, twenty-four hour reactivation, no Mg. H.—Decalcified, twenty-four hour reactivation, plus Mg.*

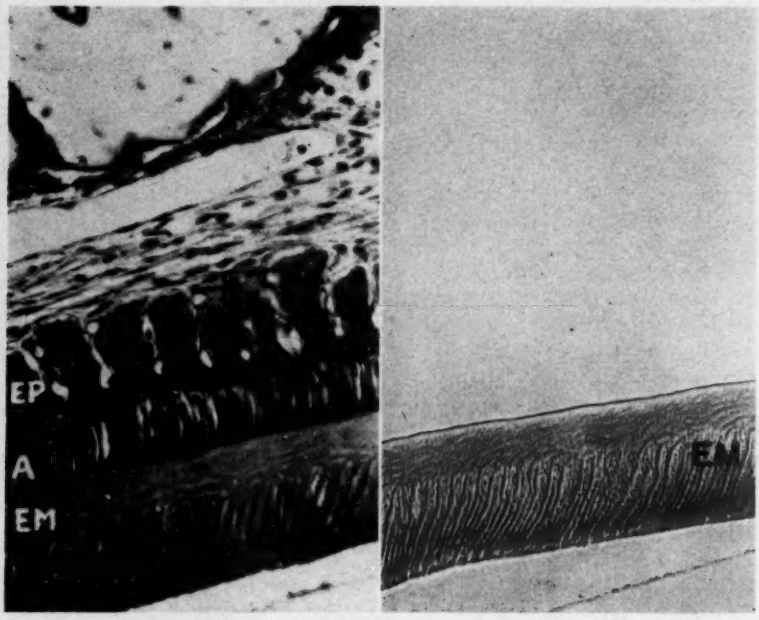



*Fig. 2.—A, ameloblasts; EM, enamel matrix; EP, papillae of enamel organ. Left: Parasagittal section of upper incisor of twenty-eight day rat. Head decalcified with formic acid plus sodium lactate (Solution 8, Table 1). Section reactivated twenty-four hours in alkaline buffer and incubated with glycerophosphate plus magnesium. Phosphatase is concentrated in the reduced enamel organ consisting of the papillae, stratum intermedium and ameloblasts. Portions of the periodontal membrane and maxillary bone also are shown. Darkness of the enamel matrix (compare with Right) is not due to phosphatase activity. Right: Adjacent section incubated without glycerophosphate in the substrate mixture. The enamel matrix is singularly darkened, perhaps because of incomplete removal of calcium phosphate*

how nearly it might be possible to bring about complete reactivation. To determine this we turned to the four day old rat head, which can be sectioned without demineralization for histochemical study. These heads were split in the midsagittal plane and each half was treated in identical fashion except that one of the halves was left in decalcifying solution for two days prior to demonstrating the phosphatase activity in each. The length of time that these half-heads were kept in decalcifying solution was, of course, much longer than was required to remove the small amount of mineral present but it was comparable to the time required to decalcify the teeth or tibias of twenty-eight day old rats. The three decalcifying fluids used were: (1) formic acid buffered with sodium citrate at pH 4.89, (2) acetic acid buffered with sodium lactate at pH 4.85 and (3) sulfosalicylic acid buffered wth sodium lactate at pH 4.84.

It was apparent in the nonreactivated sections that the phosphatase activity had been reduced greatly in all the decalcified specimens in comparison with that seen in their undecalcified controls. In this respect the formic acid-sodium citrate preparation showed somewhat less enzyme inactivation than did the

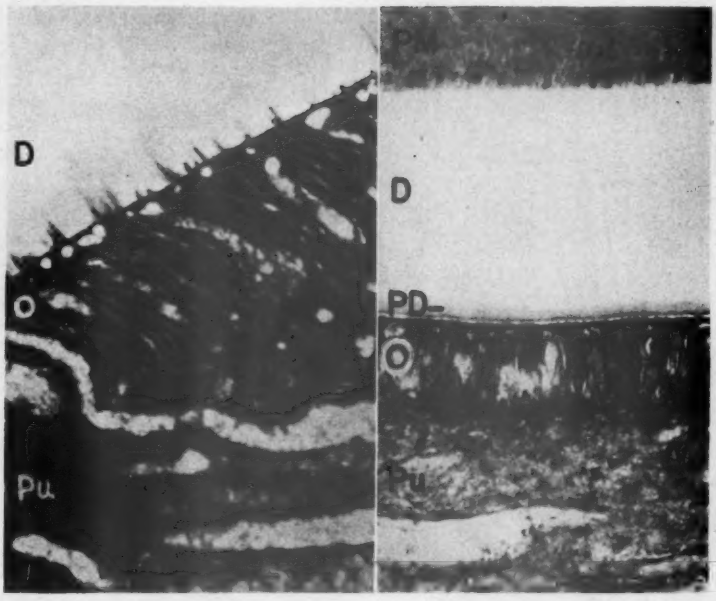



*Fig. 3.—D, dentin; O, odontoblasts; PD, predentin; PM, periodontal membrane; Pu, pulp. Left: Phosphatase in Korff's fibers, odontoblasts and dentinal processes in upper incisor. Area shown is near incisal tip of pulp chamber. Head decalcified with ammonium citrate (Solution P3R, Table 1); slide in alkaline reactivating solution twenty-four hours and incubated with glycerophosphate. Right: Section through dentin and odontoblasts on palatal aspect of upper incisor of twenty-eight day rat. Decalcified in Solution P3R, Table 1; slide in reactivating solution twenty-four hours and incubated with glycerophosphate plus magnesium. No phosphatase in dentin matrix*

other two. By reactivation in aqueous sodium diethylbarbiturate at pH 9.4± 0.1 and by adding magnesium ions to the incubating substrate, very notable improvement in activity was achieved.

Figure 1, E through H, illustrates the phosphatase reactions seen in the half-head that was not decalcified (Fig. 1, A through D). It must be appreciated that in the sections of the latter specimen, the small amount of preformed calcium phosphate in the dentin, enamel, and bone has entered into the reactions for the visualization of phosphatase in the same manner as the calcium phosphate formed during the incubation process. Control slides incubated without glycerophosphate in the substrate mixture show that this preformed material occurs only in the calcified areas and does not complicate the phosphatase distribution pattern in the soft tissues.

## Distribution in Dental and Osseous Tissue

***Teeth.***—Alkaline phosphatase is distributed widely in the soft tissues of the teeth, but it exists in far greater concentrations in some cellular components or regions than in others. It is not present in the matrix of the enamel (Fig. 2) or of the dentin (Fig. 3) or predentin. The slight darkening of the predentin border seen in Figure 3, right, is not caused by the action of phosphatase since control

*Fig. 4.—B, basal formative end; D, dentin; E, enamel; EO, enamel organ, Pu, pulp. Left: Parasagittal section through apical end of upper incisor of twenty-eight day rat. Head decalcified in sulfosalicylic acid plus sodium citrate (Solution 1, Table 1). Section incubated, without any reactivation, in glycerophosphate substrate to which glycine was added to a final concentration of 0.006 molar. Note absence of phosphatase activity in basal formative end of enamel organ and relative weakness of the reaction in the apical portion of the pulp. Right: Parasagittal section of upper incisor of twenty-eight day rat. Head decalcified in acetic acid plus sodium lactate (Solution 15, Table 1). Section in reactivating solution twenty-four hours and incubated with glycerophospate plus magnesium. There is much more evidence of phosphatase activity on labial than on palatal aspects of the pulp subjacent to odontoblasts. Same relation is true of the odontoblasts*

slides incubated without glycerophosphate in the substrate mixture have an identical appearance in this particular respect. The distribution of this enzyme in rodent teeth at the time of beginning apposition has been described in detail.[6, 12] To recapitulate briefly, the greatest activity was found in (1) the stratum intermedium and adjacent cells of the embryonal stellate reticulum, (2) the fully developed odontoblasts and (3) a thin border of pulp contiguous to the odontoblasts. Morse and Greep found no enzyme in the actively proliferating basal formative end of the reduced enamel organ and only a slight amount in the functioning ameloblasts in the four day rat incisor.

Our observations on the extent and amount of phosphatase in the incisors of twenty-eight day old rats differ from those on the younger animals in three essential respects. First we found that the ameloblasts in the decalcified heads contained a considerable amount of enzyme which was distributed throughout the cytoplasm and nucleus (Fig. 2). The enzyme appears in the cells during the unpolarized stage (Fig. 4, left) and be-

12. Bevelander, G., and Johnson, P. L., The Histochemical Localization of Alkaline Phosphatase in the Developing Tooth. *J. Cell. & Comp. Physiol.* 26:25 (August) 1945.

comes more concentrated as the cells mature. Secondly, the older animals show a particularly heavy concentration of phosphatase on the labial aspects of the pulp border (Fig. 4, right). This is consistent with the unequal growth necessary to produce the curvature of these teeth, but whether this relation is of functional significance cannot as yet be ascertained. Thirdly, the distribution of the enzyme can be observed in the epithelial papillae of the reduced enamel organ (Fig. 2, left). These papillae are not present in the four day old specimens. They are rich in phosphatase activity but the concentration is still somewhat less than is seen in the now single-cell-layered stratum intermedium (Figs. 2, left, and 4, right). It is pertinent to recall that these papillae are covered with capillaries, and it is generally believed that the peculiar tuft-like shape is an adaptation to increase the surface of the enamel-forming tissues that are exposed to the vascular supply.

The odontoblastic processes are only slightly phosphatase-positive throughout most of the dentin in the rat incisor (Fig. 3, right); the oldest processes, that is, those extending from odontoblasts located at the incisal end of the pulp, show somewhat greater phosphatase activity (Fig. 3, left).

The phosphatase distribution pattern in the cellular components of the molar teeth (Fig. 5) is not essentially different from that seen in corresponding cells of the incisors. The phosphatase in the pulp characteristically is concentrated much more in the coronal horns than elsewhere. We find that it is difficult to get proper fixation in the pulp cavity of these teeth, owing perhaps to the narrowness of the apical foramen. We therefore turned largely to a study of the incisor where fixation of the tissue in the pulp chamber is much more satisfactory.

Viewing the distribution of alkaline phosphatase in teeth in broader scope, it does seem noteworthy that this enzyme which splits phosphate ions from organophosphates appears in the earliest epithelial and mesenchymal odontogenic rudiments and that it becomes more abundant and more unevenly distributed as differentiation proceeds. Furthermore the sites of greatest concentrations of this enzyme are associated with the tissues that are concerned intimately with the deposition of phosphate compounds.

In histochemical demonstrations of alkaline phosphatase both the nucleus and the cytoplasm ordinarily show a positive reaction. In a previous study of phosphatase in teeth,[6] wherein the hydrogen ion concentration of the substrate (glycerophosphate) was varied from pH 7 to 11.5, it was found that the nuclear phosphatase reaction was much stronger than that in the cytoplasm up to pH 9. At pH values higher than 9.5, the enzyme activity was demonstrable only in the cytoplasm. However, the pH

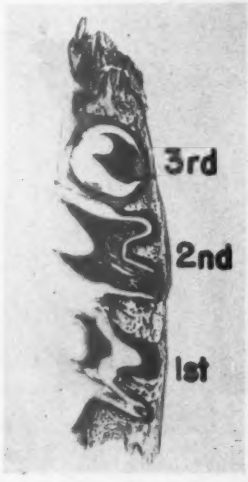



*Fig. 5.—Phosphatase in upper molars of twenty-eight day rat; the first and second molars are erupted. Head decalcified in Solution P3R, Table 1. Slide in reactivating solution twenty-four hours and incubated with glycerophosphate plus magnesium*

optimum for the enzyme located in either structure lies between 9 and 9.5.

In the present investigation all sections were incubated with substrate at pH 9.5, hence both the nucleus and the cytoplasm could be expected to show a roughly maximal reaction. Some of our decalcifying solutions tended to accentuate slightly the reaction in either the cytoplasm or the nucleus; the sulfosalicylic acid-sodium citrate mixture especially emphasized the nuclear reaction.

***Bone and Cartilage.***—It has been known since 1924[13] that extracts of resting hyaline cartilage contain scarcely any alkaline phosphatase, whereas those of ossifying cartilage such as the costochondral junction, as well as extracts of growing bones, are among the richest known sources of this enzyme. The implication which these findings had for subsequent histochemical observation of the location of this enzyme could not be realized because the activity invariably was destroyed by the acids used during decalcification.

By modifying the decalcification procedure and utilizing the phosphatase reactivation process as herein described, we have been able to secure satisfactory histochemical preparations of the tibia of growing (twenty-eight day old) rats (Fig. 6, center); moreover several bones of the face and skull included in section of the upper jaw have been observed (Figs. 2, left and 4, right).

13. Robison, R., and Soames, K. M., The Possible Significance of Hexosephosphoric Esters in Ossification. II. The Phosphoric Esterase of Ossifying Cartilage. *Biochem. J.* 18:740 (Nos. 3 & 4) 1924.

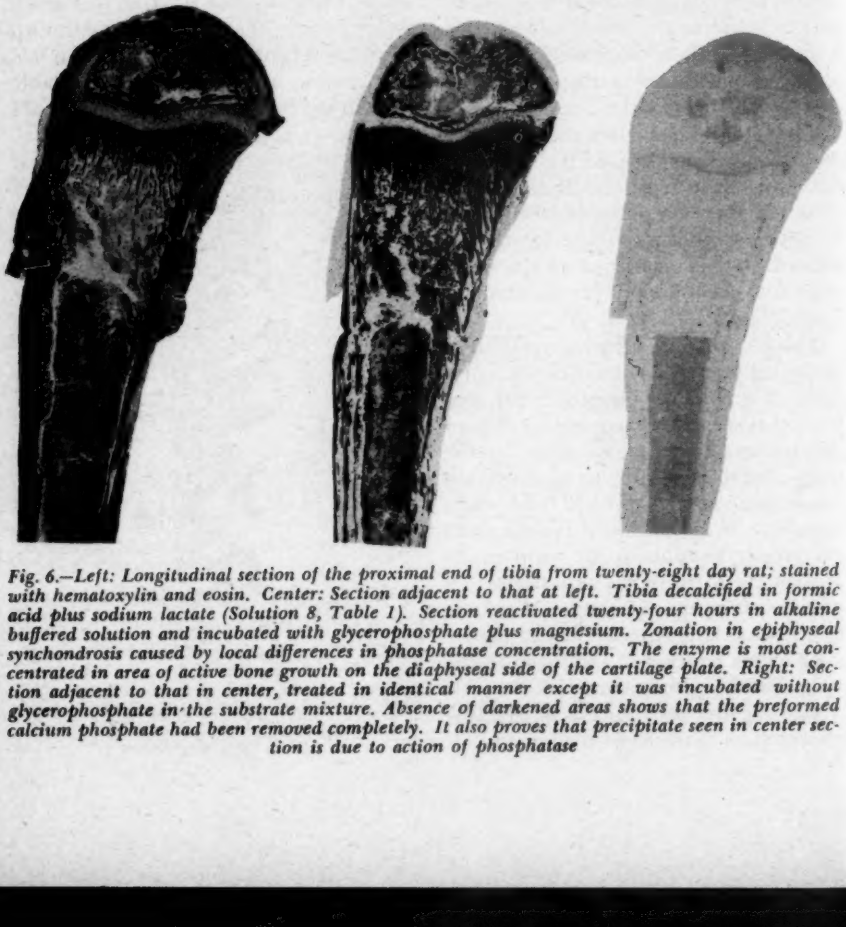


*Fig. 6.—Left: Longitudinal section of the proximal end of tibia from twenty-eight day rat; stained with hematoxylin and eosin. Center: Section adjacent to that at left. Tibia decalcified in formic acid plus sodium lactate (Solution 8, Table 1). Section reactivated twenty-four hours in alkaline buffered solution and incubated with glycerophosphate plus magnesium. Zonation in epiphyseal synchondrosis caused by local differences in phosphatase concentration. The enzyme is most concentrated in area of active bone growth on the diaphyseal side of the cartilage plate. Right: Section adjacent to that in center, treated in identical manner except it was incubated without glycerophosphate in the substrate mixture. Absence of darkened areas shows that the preformed calcium phosphate had been removed completely. It also proves that precipitate seen in center section is due to action of phosphatase*

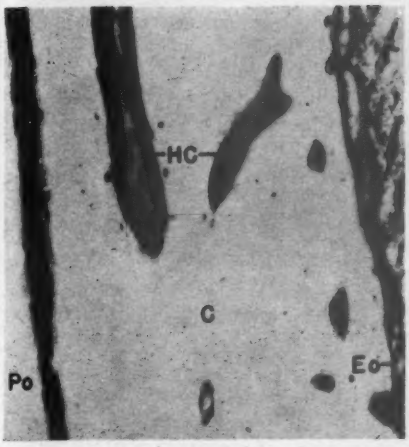



*Fig 7.—C, cortex of shaft of tibia; Eo, endosteum; HC, haversian canals; Po, periosteum. Magnified area of cortex of tibial shaft shown in Fig. 6, center. The periosteum and endosteum are strongly phosphatase-positive as are the haversian canals; the osteocytes have little or no phosphatase*

The ground substance of bone is devoid of alkaline phosphatase and in these preparations provides a colorless background for the phosphatase-laden, hence blackened, haversian canals and Volkmann's canals, thus giving the effect of a photographic print (Fig. 7). The phosphatase in the haversian canals is principally in the osteoblasts and the walls of blood vessels. The osteocytes (Figs. 2, left, and 7) are somewhat variable in their reaction; some seem to have no enzyme while others are weakly active. Allowing for the probability of slow penetration of the fixing agent (80 per cent alcohol) along the canaliculi, it is apparent nevertheless that the osteocytes are comparatively poor in phosphatase. The osteoclasts likewise show only a faint reaction; in fact their identification sometimes is made difficult. The periosteum and the endosteum show moderate activity and clearly outline the cortex of the shaft (Figs. 6, center, and 7).

Our primary objective with respect to the histochemical demonstration of phosphatase in the long bones was to observe the distribution of this enzyme in the epiphyseal synchondroses, the most highly organized centers of endochondral ossification. In longitudinal sections of the proximal portion of the tibia, (Figs. 6 and 8), the phosphatase distribution imparts a division of these epiphyseal plates into transversely located zones of unequal width according to different local enzyme concentrations. Since these zones correspond closely

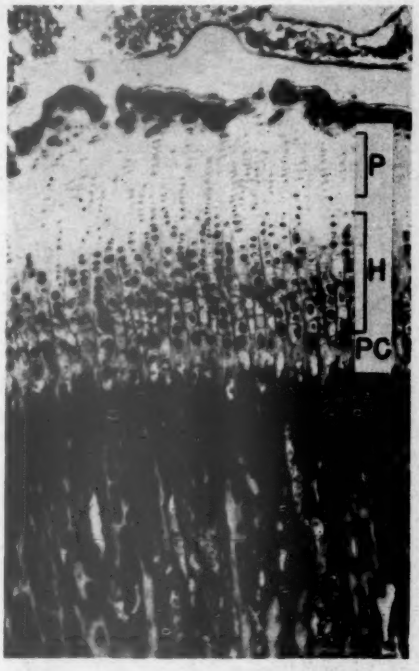



*Fig. 8.—An area of the epiphyseal plate in Figure 6, center, magnified to show distribution of phosphatase in more detail. In the zone of proliferation (P) there is no enzyme in the matrix and little in the cells. In the hypertrophic zone (H) there is an abundance of enzyme in the cells and it also appears in the interstitial substance. In the zone of provisional calcification (PC) there is no enzyme in the degenerating cells but much in the interstitial substance*

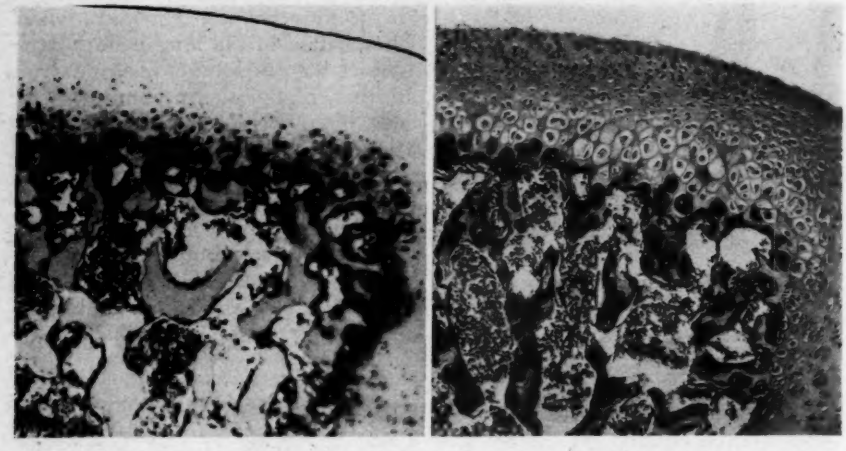


*Fig. 9.—Left: Portion of articular cartilage shown in Figure 6, center, enlarged to show enzyme distribution in more detail. Note absolute absence of enzyme activity in broad band next to articulating surface (sketched in). Distribution of enzyme in hypertrophic zone (H) and zone of provisional calcification is fundamentally the same as that in corresponding areas of the epiphyseal synchondrosis but pattern is less clear because of wavyness of ossifying surface. Right: Portion of the articular cartilage shown in Figure 6, left (hematoxylin and eosin) enlarged to show extent of articular cartilage, invisible in section at left*

with the conventional histologic divisions, they can be so described. The zone of proliferation (Fig. 8) contains no phosphatase in the interstitial substance and only a trace in the cells. Phosphatase appears in the cartilage cells as they enter the zone of hypertrophy and begin to enlarge and arrange themselves into closely spaced columns. These cells become progressively richer in phosphatase as they move distally. The enzyme also appears in the matrix in the proximal third of the zone of hypertrophy and becomes more concentrated in the distal portions. In the zone of provisional calcification (Fig. 8) phosphatase is present only in the matrix. The capillary tufts from the marrow which encroach upon and open up the cartilage columns and the associated osteoblasts are extremely rich in phosphatase (Fig. 8).

The phosphatase reaction of the osteoblasts varies with the intensity of osteogenic activity. This is shown particularly well in the spongy bone of the tibia. The strongest reactions are seen in the region bordering on the epiphyseal synchondrosis. The osteoblasts located farther along these trabeculae where bone formation is less rapid show a gradually diminishing concentration of the enzyme. Although their activity varies to some extent, it should be pointed out that the osteoblasts as a class react at least as intensely as any phosphatase-bearing tissue which has been observed.

The articular cartilage shows an extreme difference in the local concentration of alkaline phosphatase (Fig. 9, left). A broad band bordering on the articulating surface is absolutely devoid of enzyme activity. This band is so free of precipitate that it could not be seen in these preparations when viewed with transmitted light. Adjacent sections stained with hematoxylin and eosin reveal the extent of the area (Figs. 6, left, and 9, right). It contains flattened cartilaged cells and rather strongly baso-

philic matrix. Here the proliferative activity is believed to be comparatively slight and to occur through amitosis. Beneath this clear zone the cells contain a great amount of phosphatase and the matrix contains some. At the junction of cartilage and bone over the entire circumference of the epiphysis in these young animals, the osteoblasts are intensely phosphatase-positive (Fig. 9, left).

In resting hyaline cartilage, as seen in sections through the nasal cavity, there is no trace of glycerophosphatase in the interstitial substance and none in the cytoplasm of the cells; the nuclei show a faint reaction in the nucleoli only. In or near a center of endochondral ossification, however, the picture is quite different (Fig. 10). The cells react intensely, and the matrix becomes moderately positive. The segregated portions of the matrix which are undergoing temporary calcification react strongly, but the cartilage cells bordering on these structures show little or no reaction.

Our observations on the phosphatase in bone marrow stained *in situ* are in agreement with previous descriptions.[14, 15] The spotty distribution described by Wislocki and Dempsey and attributed by them to stronger reactions in the neighborhood of vessels also characterizes these preparations. There are no cells here which react intensely, and the identification of exact cell types is impossible. In general, the cells with most phophatase appear to be hemocytoblasts. They are fairly large and round with centrally placed single nuclei. The fatty marrow of the epiphysis does not react differently from that in the diaphysis.

14. Bourne, G., The Distribution of Alkaline Phosphatase in Various Tissues. *Quart. J. Exper. Physiol.* 32:1 (May) 1943.

15. Wislocki, G. B., and Dempsey, E. W., Observations on the Chemical Cytology of Normal Blood and Hemopoietic Tissues. *Anat. Rec.* 96:247 (November) 1946.

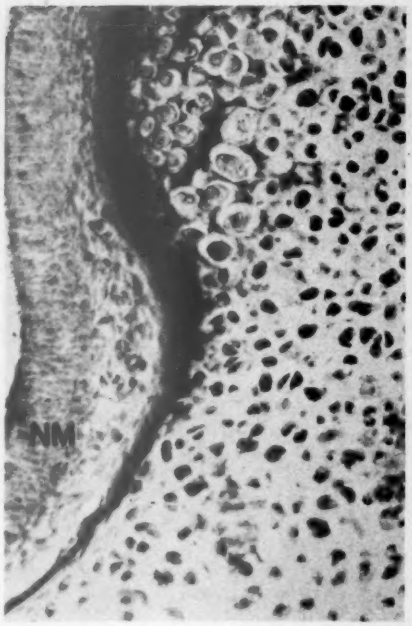



*Fig. 10.—Ossification center in nasal cartilage of four day rat. Half-head decalcified in formic acid plus sodium citrate at pH 4.89. Section reactivated twenty-four hours and incubated with glycerophosphate plus magnesium. Note appearance of phosphatase activity in the cartilage matrix, its abundance in the spicule (upper central) of cartilage which is undergoing temporary calcification and its relative reduction in the contiguous cells*

## Summary

Alkaline phosphatase was demonstrated in the teeth and bones of twenty-eight day old rats after decalcification in solutions of weak acids buffered to pH 4.8 to 5 with the sodium salts of weak acids. Complete removal of the mineral usually required from one to five days. The phosphatase always was lost when the pH was lower than 4.78, and invariably it was destroyed when the decalcification required more than five days, irrespective of pH.

Although all the decalcifying fluids had a significant inactivating effect on

glycerophosphatase, this was reversible. By reactivating the tissue enzyme in a buffered alkaline solution at icebox temperature and by adding magnesium ions to the substrate mixture during incubation, histochemical preparations were obtained which showed maximal or nearly maximal phosphatase reactions.

The localization and relative concentration of alkaline phosphatase in the cellular components and the hard-tissue matrices of the incisor tooth and the tibia of the twenty-eight day old rat are described and illustrated.

### Lorch's Method

A detailed account of the method used by Lorch to demonstrate alkaline phosphatase in decalcified bones has been published recently (Lorch, I. J., Localization of Alkaline Phosphatase in Mammalian Bones. *Quarterly Journal of Micro. Science* 88:367 September, 1947). The method which she proposed and the one described by us were developed simultaneously here and in England and are quite similar. The addition of zinc during the decalcification process as recommended by her appears to be advantageous. However, some hesitancy in the use of this metal may be justified since its effect on phosphatase is still somewhat questionable. The histological distribution of phosphatase in osseous tissues as given by Lorch is in good agreement with our observations.

***Problems of the Disabled.***—The traditional attitude toward the crippled and disabled in the United States has been one of charity. These unfortunates have been regarded with sympathy and have too long considered their plight as one of inevitable helplessness and dependency. Out of this negative attitude has grown the sense of failure on the part of the cripple himself and the manifestation of such sorely degenerative practices as begging. . . .

Each physically handicapped person is an individual problem of vocational maladjustment. Yet he has never been regarded as an individual but rather as a class, a permanently dependent class. Workmen's compensation legislation, together with pressure from veterans' groups and social welfare organizations, has helped to alter this concept from a permanent to a temporary dependence. The utimate aim is to change the idea of dependence, altogether, to one of vocational adjustment. To that end remedies are being sought by means of new social attitudes and of legislation. The problems of all the disabled are similar: discriminated against in the general labor market, their employment opportunities are necessarily restricted; and all of them require some degree of medical care, vocational training, placement, and in some cases pensions.—*Henry H. Kessler, Rehabilitation of the Physically Handicapped. New York: Columbia University Press, 1947.*

# DENTAL EFFECTS OF ACCIDENTALLY FLUORINATED WATER: I. DENTAL CARIES EXPERIENCE IN DECIDUOUS AND PERMANENT TEETH OF SCHOOL AGE CHILDREN

Henry Klein, D.D.S., Sc.D., Washington, D. C.

IT IS established fairly well now that children consuming waters containing trace amounts of fluorine (1 to 2 parts per million) experience less dental decay than do comparable children taking fluoride-free waters. On the basis of such findings, several communities in the United States are deliberately introducing sodium fluoride into their public water supplies in order to study over a ten year period the effects of the artificial fluorination of public water supplies on the dental caries experience of the population.[1] Accordingly, were a community to be discovered where water supplies had become fluorinated more than a decade ago, perhaps significant findings could be anticipated with regard to the effects of artificial fluorination.

Such an area has been identified in New Jersey where the community water supplies may be presumed to have contained from 1.2 to 2.2 p.p.m. of fluoride for nineteen years. The fluorination in this area was accomplished accidentally when the communities changed in 1927 from a fluoride-free water derived from wells approximately 100 to 130 feet in depth to fluoride-bearing waters derived from wells tapping the Raritan stratum at a depth of approximately 500 to 700 feet. This area provided an opportunity to study systematically the effects, dental and otherwise, of an exposure of nearly two decades to waters containing fluorides to the extent of 1.2 to 2.2. p.p.m.

In order to provide a complete set of data for the study, a control area located in close proximity was selected. The waters now delivered in the control area are derived from the same stratum as were the waters delivered to the fluoride communities previous to 1927. These waters are fluoride-free. However, the unusual intensity of dental caries attack in the control communities raises the question as to whether these latter waters contain principles which favor dental decay.[2]

## Method

The fluoride area includes three communities, Glassboro, Pitman and Woodstown. The nonfluoride area includes two communities, Clayton and Williamstown. Glassboro and Pitman, of approximately 5,000 population each and separated by a distance of about 3 miles, are located at the geographic center of Gloucester County. They now receive their water supply from fairly deep wells; the Glassboro well is approximately 600 feet deep and has been in use since 1927. The water supply at

From the Division of Public Health Methods, United States Public Health Service. Paper II in this series is published in *Public Health Reports*, April 30, 1948.

Dental public health administrator, United States Public Health Service, at present on leave of absence as dental adviser, American Joint Distribution Committee. Paris, France.

1. *Fluorine in Dental Public Health.* Symposium Conference of the New York Institute of Clinical Oral Pathology, October 30, 1944. New York.

2. Klein, Henry, Do Certain Drinking Waters Favor Dental Caries? *Science* 105:4 (January 3) 1947.

Pitman is obtained from two deep wells each about 500 feet deep. The one supplying the larger proportion of the population has been in use since 1927; the other was placed in operation in 1937.[3]

Before 1927 the water supplied to Glassboro was obtained from wells approximately 100 feet deep located at Clayton, whose water supply also was obtained from the same source. Previous to 1927 the water supplied to Pitman was obtained from wells under 200 feet in depth.[4]

Williamstown derives its water from wells about 130 feet deep. Both Clayton and Williamstown presumably now tap the same stratum and receive the same type of water as was delivered at Glassboro and Pitman previous to 1927. The water at Woodstown is obtained from a well driven in 1927 to a depth of over 700 feet. Before 1927 the water supply at Woodstown was obtained from relatively shallow wells and presumably was fluoride-free. Single sample analyses of these several waters indicate the following fluoride content in parts per million (May 1946):

| | |
|---|---|
| Woodstown | 2.2 |
| Glassboro | 1.3 |
| Pitman—Well 1 | 1.7 |
| Pitman—Well 2 | 1.4 |
| Williamstown | 0.1 (fluoride-free) |
| Clayton | 0.1 (fluoride-free) |

More than 3,100 school children were examined in all the communities during the winter of 1945 and spring of 1946.[5] As shown in Table 1, 944 of these children were lifetime residents (born and reared) of the fluoride area and used the city water supply all their lives; 340 were born and reared in the nonfluoride area and used that city water all their lives; 599 other children who attended the schools in either the fluoride or nonfluoride areas were born and reared in their respective areas but had used water from shallow wells at their individual farm homes. Children totaling 882 were migrants into the fluoride area (coming from outside the nonfluoride areas) and 425 children were migrants into the nonfluoride areas (coming from outside the fluoride areas).

In this report, the extent to which caries attacks the children is measured in terms of three different rates. The amount of caries experienced in the deciduous teeth is measured as the number of such teeth decayed plus the number filled (numerator) divided by the number of deciduous teeth present in the mouth, times 100. This is a caries prevalence rate which is calculated for each single year of age from 5 through 12 years.

Caries experience in the permanent teeth is expressed in terms of two different rates. The first is a prevalence rate: the number of permanent teeth decayed, missing and filled[6] (numerator) divided by the number of children. This rate is derived for each single year of age from 6 through 18 years. The second rate used for the permanent teeth is an incidence rate: the amount of caries experienced (for particular five-year age groups of children covering the range from 5 through 19 years) per 100 person-years of age. This latter rate describes the amount of caries experienced per 100 aggregate years of age of the children in the given age group. The rate is used here because it takes account of and con-

3. Of persons who consume water from this well, only those younger than 10 years of age were included in this study.

4. The 1918 annual report of the New Jersey State Health Department indicates a deep well in Pitman. Although such a well existed it was used privately and not as a community water source.

5. All children were examined by the author and Dr. John F. Cody, senior assistant dental surgeon, USPHS. The findings were recorded with the assistance of Mrs. Russell T. Atkinson.

6. The symbol *DMF*, first proposed in 1937[7] and now widely used, indicates decayed, missing and filled permanent teeth.

7. Klein, Henry, and Palmer, C. E., Dental Caries in American Indian Children. *Public Health Bulletin No. 239*. Washington, D. C.: U. S. Government Printing Office (December) 1937.

Table 1.—Children included in survey

| Locality | Residence history | Water source | Sex | Age at survey (years) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | All |
| Non-fluoride | Born and reared | City | Boys | 5 | 10 | 13 | 19 | 21 | 15 | 10 | 12 | 20 | 12 | 11 | 8 | 4 | 3 | 163 |
| | | | Girls | 5 | 18 | 17 | 24 | 20 | 9 | 11 | 14 | 12 | 11 | 16 | 7 | 11 | 2 | 177 |
| | | | Both | 10 | 28 | 30 | 43 | 41 | 24 | 21 | 26 | 32 | 23 | 27 | 15 | 15 | 5 | 340 |
| | | Home well | Boys | — | 10 | 10 | 7 | 5 | 9 | 9 | 7 | 11 | 9 | 23 | 8 | 11 | 5 | 124 |
| | | | Girls | — | 6 | 13 | 6 | 8 | 8 | 5 | 11 | 9 | 10 | 22 | 18 | 7 | 11 | 134 |
| | | | Both | — | 16 | 23 | 13 | 13 | 17 | 14 | 18 | 20 | 19 | 45 | 26 | 18 | 16 | 258 |
| | Migrants | City | Boys | 5 | 17 | 12 | 21 | 18 | 22 | 14 | 16 | 15 | 22 | 27 | 18 | 17 | 3 | 227 |
| | | | Girls | 2 | 16 | 14 | 11 | 13 | 12 | 18 | 12 | 13 | 25 | 21 | 19 | 14 | 8 | 198 |
| | | | Both | 7 | 33 | 26 | 32 | 31 | 34 | 32 | 28 | 28 | 47 | 48 | 37 | 31 | 11 | 425 |
| Fluoride | Born and reared | City | Boys | 37 | 35 | 63 | 46 | 53 | 43 | 30 | 26 | 37 | 30 | 27 | 32 | 21 | 7 | 487 |
| | | | Girls | 40 | 44 | 43 | 44 | 41 | 29 | 27 | 30 | 25 | 28 | 38 | 37 | 22 | 9 | 457 |
| | | | Both | 77 | 79 | 106 | 90 | 94 | 72 | 57 | 56 | 62 | 58 | 65 | 69 | 43 | 16 | 944 |
| | | Home well | Boys | 6 | 5 | 8 | 5 | 9 | 8 | 8 | 8 | 7 | 24 | 34 | 30 | 14 | 4 | 170 |
| | | | Girls | 9 | 5 | 8 | 13 | 9 | 4 | 7 | 7 | 16 | 19 | 24 | 29 | 17 | 4 | 171 |
| | | | Both | 15 | 10 | 16 | 18 | 18 | 12 | 15 | 15 | 23 | 43 | 58 | 59 | 31 | 8 | 341 |
| | Migrants | City | Boys | 15 | 26 | 34 | 30 | 39 | 28 | 42 | 21 | 34 | 46 | 46 | 33 | 33 | 6 | 433 |
| | | | Girls | 8 | 36 | 27 | 38 | 18 | 27 | 40 | 35 | 32 | 50 | 53 | 32 | 36 | 17 | 449 |
| | | | Both | 23 | 62 | 61 | 68 | 57 | 55 | 82 | 56 | 66 | 96 | 99 | 65 | 69 | 23 | 882 |
| All | All | All | Boys | 68 | 103 | 140 | 128 | 145 | 125 | 113 | 90 | 124 | 143 | 168 | 129 | 100 | 28 | 1604 |
| | | | Girls | 64 | 125 | 122 | 136 | 109 | 89 | 108 | 109 | 107 | 143 | 174 | 142 | 107 | 51 | 1586 |
| | | | Both | 132 | 228 | 262 | 264 | 254 | 214 | 221 | 199 | 231 | 286 | 342 | 271 | 207 | 79 | 3190 |

Table 2.—Number of deciduous teeth, carious or filled, per 100 deciduous teeth present in children born and reared in specified areas

| Locality | Water source | Sex | Age at survey (years) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Non-fluoride | City | Boys | 20.2 | 22.7 | 50.6 | 43.7 | 47.7 | 45.6 | 28.2 | 37.9 |
| | | Girls | 16.3 | 19.7 | 35.2 | 40.5 | 46.3 | 35.0 | 38.5 | 100.0 |
| | | Both* | 18.3 | 21.2 | 42.9 | 42.1 | 47.0 | 40.3 | 33.4 | 69.0 |
| | Home well | Boys | — | 26.5 | 60.8 | 42.6 | 57.9 | 38.8 | 81.3 | 100.0 |
| | | Girls | — | 31.2 | 31.7 | 35.3 | 44.1 | 60.6 | 95.2 | 50.0 |
| | | Both* | — | 28.9 | 46.3 | 39.0 | 51.0 | 49.7 | 88.3 | 75.0 |
| Fluoride | City | Boys | 3.0 | 5.1 | 12.5 | 13.1 | 22.7 | 15.1 | 22.7 | 26.8 |
| | | Girls | 2.6 | 9.4 | 8.8 | 11.7 | 22.1 | 21.9 | 27.6 | 46.1 |
| | | Both* | 2.8 | 7.3 | 10.7 | 12.4 | 22.4 | 18.5 | 25.2 | 36.5 |
| | Home well | Boys | 15.9 | 29.4 | 47.2 | 35.5 | 59.6 | 29.4 | 33.3 | 63.6 |
| | | Girls | 10.4 | 18.4 | 35.6 | 47.8 | 43.6 | 36.0 | 52.6 | — |
| | | Both* | 13.2 | 23.9 | 41.4 | 41.7 | 51.6 | 32.7 | 43.0 | — |

*Simple arithmetic mean of sex-specific rates.

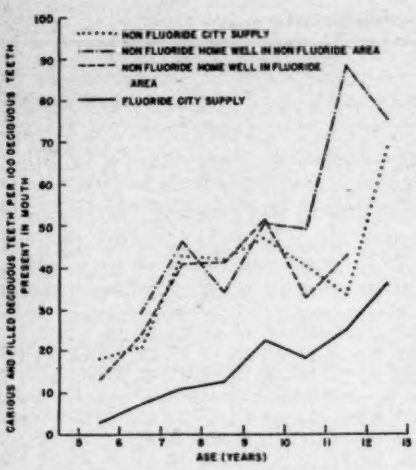

NON FLUORIDE CITY SUPPLY
NON FLUORIDE HOME WELL IN NON FLUORIDE AREA
NON FLUORIDE HOME WELL IN FLUORIDE AREA
FLUORIDE CITY SUPPLY
CARIOUS AND FILLED DECIDUOUS TEETH PER 100 DECIDUOUS TEETH PRESENT IN MOUTH
AGE (YEARS)

*Fig. 1.—Relation between age and number of carious and filled deciduous teeth per 100 deciduous teeth present*

trols the slight differences in the average ages of the children included in a five-year age group but differing in duration of exposure to the drinking water in the several areas. On the other hand, the caries prevalence rate (DMF teeth per child) is used, as indicated earlier, for children who were arranged in age groups of single years.

## Findings

***Deciduous Teeth of Lifetime Residents.***— Findings on caries experience in the deciduous teeth of children residing in the fluoride or nonfluoride areas are shown in Table 2 and Figure 1. The deciduous teeth are more protected against caries among children to whom the fluoride city water is available than among children who use farm well water, even though their homes are in the fluoride area. It is to be noted also that among children to whom city water is available, those receiving the fluoride water are protected significantly more against caries in the deciduous teeth than children receiving nonfluoride city water. At 5 years of age, children receiving nonfluoride city water average more than 18 decayed or filled deciduous teeth per 100 deciduous teeth present, whereas children of the same age to whom the fluoride city water is available average less than 3, a rate nearly 85 per cent below that of the children exposed to the nonfluoride water. At every age beyond 5 years and until the deciduous teeth are exfoliated (at about 12 years of age), the children of the fluoride area who drink city water average a lower caries rate in the deciduous teeth. It is to be emphasized that toward the end of the life of the deciduous teeth (at about 12 years of age) the attack rate for children in the fluoride area is about half that of children in the nonfluoride area.

***Permanent Teeth of Lifetime Residents.***— Data which give findings on the number of DMF teeth per child born and reared in the fluoride or in the nonfluoride areas are given in Table 3. These data are shown graphically in Figure 2. Children residing in the fluoride area who were born and reared therein and consumed the city water have, at every age, a lower DMF rate than do children consuming the city water in the nonfluoride area. With advancing age the absolute difference between the two groups widens. However, the relative differences decrease with advancing age. At 7 years of age the children of the fluoride area have a DMF rate nearly 90 per cent lower than the children of the nonfluoride area; at 10 years of age the former have a rate about 77 per cent lower than the nonfluoride children; and at age 15 they are 71 per cent lower. For all ages considered together among children born and reared in one area or the other, those consuming the fluoride water have an average DMF rate nearly 70 per cent lower than do the children taking the nonfluoride water.

***Home Wells versus City Water*** — Of the

Table 3.—Number of DMF teeth per child (permanent dentition)

| Locality | Residence history | Water source | Sex | Age at survey (years) 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | All* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-fluoride | Born and reared | City | Boys | 0.0 | 2.0 | 1.8 | 2.8 | 3.1 | 2.7 | 4.6 | 6.8 | 9.1 | 8.8 | 11.8 | 6.8 | 16.7 | 5.9 |
| | | | Girls | 0.4 | 1.5 | 2.5 | 2.3 | 3.1 | 6.6 | 5.6 | 7.8 | 9.8 | 9.8 | 12.4 | 11.9 | 12.5 | 6.6 |
| | | | Both† | 0.2 | 1.8 | 2.2 | 2.6 | 3.1 | 4.7 | 5.1 | 7.3 | 9.5 | 9.3 | 12.1 | 9.4 | 14.6 | 6.3 |
| | | Home well | Boys | 0.1 | 2.0 | 1.6 | 2.4 | 2.8 | 3.2 | 5.3 | 6.6 | 8.3 | 8.3 | 9.9 | 9.4 | 8.6 | 5.3 |
| | | | Girls | 1.1 | 1.0 | 3.0 | 3.3 | 4.4 | 7.2 | 7.3 | 9.0 | 8.2 | 11.5 | 11.7 | 15.5 | 10.8 | 7.2 |
| | | | Both† | 0.6 | 1.5 | 2.3 | 2.9 | 3.6 | 5.2 | 6.3 | 7.8 | 8.3 | 9.9 | 10.8 | 12.5 | 10.2 | 6.3 |
| | Migrants | City | Boys | 0.4 | 0.6 | 1.8 | 1.9 | 2.5 | 2.9 | 3.9 | 6.1 | 7.5 | 7.6 | 9.4 | 9.4 | 9.3 | 4.9 |
| | | | Girls | 0.3 | 1.0 | 1.6 | 2.5 | 3.4 | 3.7 | 3.9 | 8.8 | 7.5 | 8.1 | 11.2 | 10.4 | 13.3 | 5.8 |
| | | | Both† | 0.4 | 0.8 | 1.7 | 2.2 | 3.0 | 3.3 | 3.9 | 7.5 | 7.5 | 7.9 | 10.3 | 9.9 | 11.3 | 5.4 |
| Fluoride | Born and reared | City | Boys | 0.0 | 0.1 | 0.2 | 0.4 | 0.7 | 0.6 | 1.2 | 1.9 | 1.3 | 2.3 | 2.8 | 4.8 | 5.4 | 1.7 |
| | | | Girls | 0.1 | 0.2 | 0.4 | 0.7 | 0.7 | 0.9 | 1.5 | 2.0 | 3.0 | 3.0 | 4.4 | 5.0 | 3.8 | 2.0 |
| | | | Both† | 0.1 | 0.2 | 0.3 | 0.6 | 0.7 | 0.8 | 1.4 | 2.0 | 2.2 | 2.7 | 3.6 | 4.9 | 4.6 | 1.9 |
| | | Home well | Boys | 0.0 | 1.6 | 2.2 | 1.1 | 2.1 | 1.5 | 2.5 | 6.4 | 7.0 | 7.0 | 7.2 | 8.3 | 7.3 | 4.2 |
| | | | Girls | 0.0 | 0.9 | 1.5 | 1.1 | 1.8 | 3.1 | 4.4 | 5.5 | 7.0 | 7.5 | 8.5 | 6.6 | 3.3 | 4.5 |
| | | | Both† | 0.0 | 1.3 | 1.9 | 1.1 | 2.0 | 2.3 | 3.5 | 5.9 | 7.0 | 7.3 | 7.9 | 7.5 | 5.3 | 4.4 |
| | Migrants | City | Boys | 0.2 | 0.2 | 0.4 | 1.4 | 1.1 | 2.2 | 2.2 | 3.9 | 4.9 | 7.2 | 6.9 | 6.5 | 6.7 | 3.4 |
| | | | Girls | 0.2 | 0.5 | 1.6 | 1.8 | 1.9 | 2.4 | 3.5 | 4.7 | 6.8 | 7.2 | 8.9 | 7.8 | 8.5 | 4.3 |
| | | | Both† | 0.2 | 0.4 | 1.0 | 1.6 | 1.5 | 2.3 | 2.8 | 4.3 | 5.9 | 7.2 | 7.9 | 7.2 | 7.6 | 3.9 |

*Simple arithmetic mean of age-specific rates.
†Simple arithmetic mean of sex-specific rates.

1,285 children born and reared in the fluoride area, 341, or approximately 26 per cent, received their drinking water at home from farm wells. Those children obtained city water while attending school in the fluoride area.

As shown by the data given in Table 3 and Figure 2, the children drinking farm well water in the fluoride area are not protected against caries to the same extent as are the children consuming the city water. However, they experience some benefit (presumably by drinking the fluorine water during school attendance) because their caries rates are lower than those of children exposed to city water in the nonfluoride area.

Among the 598 children born and reared in the nonfluoride area, 258 or about 43 per cent were from homes where the water was obtained from individual farm wells. As shown by the data given in Table 3 and Figure 2, the caries

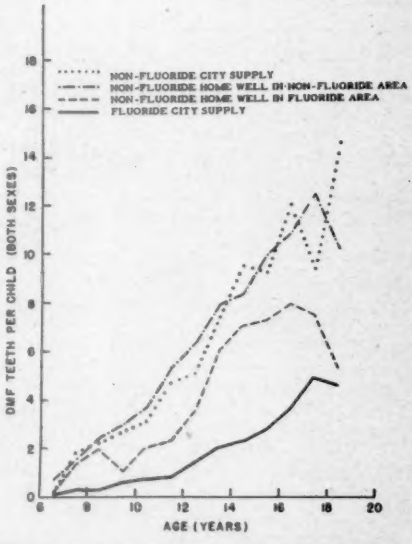



*Fig. 2.—Relation between age and number of DMF teeth per child born and reared in specified area*

rates of such children do not differ significantly from those of children consuming the city water in the same area.

***Deciduous Teeth of Migrants.***—Findings on the deciduous teeth of migrants into the two areas are shown in Table 4 and are summarized in Figure 3. Among migrants into the fluoride area 5 to 9 years of age at the time of survey, those in the area the shortest time (0 to 4 years) average 26.0 carious or filled deciduous teeth per 100 deciduous teeth present, whereas children of the same age resident in the area the longest time (5 to 9 years) average about half that rate (13.6). Among migrants to the fluoride area 10 to 14 years of age, those who have been residents 0 to 4 years average nearly 51 attacked deciduous teeth per 100 deciduous teeth present, whereas those resident 5 to 9 years average less than 36 attacked deciduous teeth per 100. It should be pointed out that the protective effect of exposure is more pronounced for the younger children, resulting in a relative difference of the order of 50 per cent in the caries attack rate between the longest and shortest exposure for 5 to 9 year old children, whereas the corresponding difference for the older children is of the order of 30 per cent; that is, the sooner a child born outside the fluoride area takes residence in the area, the lower the caries attack rate in the deciduous teeth.

Children 5 to 9 years old at the time of survey and born and reared in the fluoride area (and therefore having a lifetime exposure) average 11.1 attacked deciduous teeth per 100 deciduous teeth present, as contrasted with the corresponding rate of 13.6 for children

**Table 4—Number of deciduous teeth, carious or filled, per 100 deciduous teeth for migrants into specified areas**

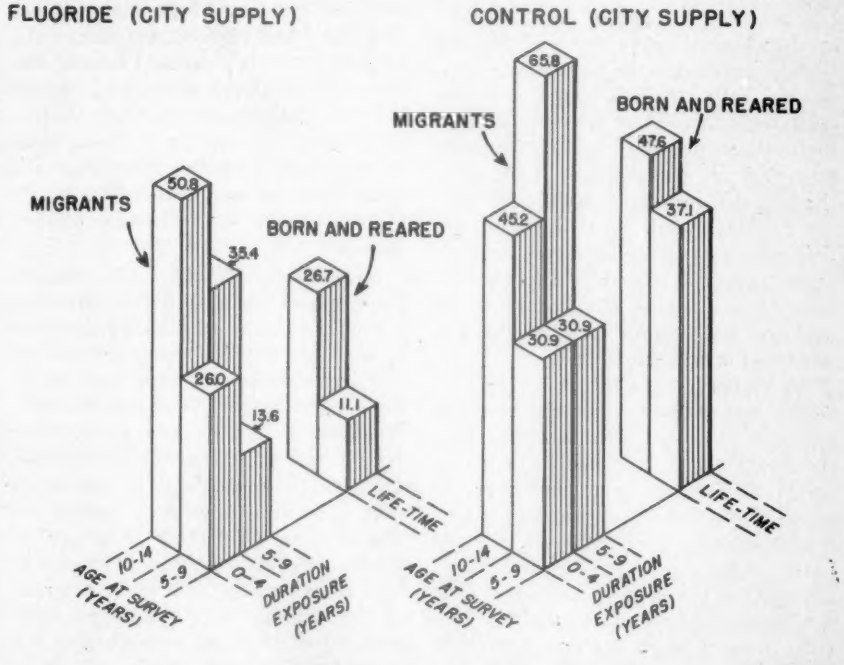
| Age Group | Area | Sex | Duration of exposure (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 5-9 | Fluoride | Boys | 24.3 | 26.2 | 24.4 | 24.8 | 20.3 | 18.3 | 11.1 | 19.1 | 22.4 | — |
| | | Girls | 22.1 | 17.3 | 27.2 | 20.4 | 37.0 | 10.1 | 18.1 | 14.7 | 0.0 | 11.1 |
| | | Both† | 23.2 | 21.8 | 25.8 | 22.6 | 28.7 | 14.2 | 14.6 | 16.9 | 11.2 | 11.1‡ |
| | Non-fluoride | Boys | 29.6 | 17.5 | 16.7 | 32.6 | 49.2 | 28.8 | 35.7 | — | — | — |
| | | Girls | 20.0 | 34.8 | 57.1 | 30.4 | 21.4 | 29.4 | 66.7 | — | 12.5 | — |
| | | Both† | 24.8 | 26.2 | 36.9 | 31.5 | 35.3 | 29.1 | 51.2 | — | 12.5‡ | — |
| 10-14 | Fluoride | Boys | 83.3 | 50.0 | 47.6 | 32.8 | 36.2 | 27.7 | 25.5 | 27.3 | 50.0 | 6.7 |
| | | Girls | 100.0 | 35.7 | 55.9 | — | 33.3 | 34.6 | 45.5 | 28.0 | 19.4 | 88.9 |
| | | Both† | 91.7 | 42.9 | 51.8 | 32.8‡ | 34.8 | 31.2 | 35.5 | 27.7 | 34.7 | 47.8 |
| | Non-fluoride | Boys | 47.4 | 0.0 | 100.0 | 33.3 | 95.2 | 33.3 | 25.0 | 68.8 | 45.5 | 100.0 |
| | | Girls | — | 0.0 | 0.0 | — | — | — | 100.0 | — | 63.6 | — |
| | | Both† | 47.4‡ | 0.0 | 50.0 | 33.3‡ | 95.2‡ | 33.3‡ | 62.5 | 68.8‡ | 54.6 | 100.0‡ |
| All | Fluoride | Boys | 53.8 | 38.1 | 36.0 | 28.8 | 28.3 | 23.0 | 18.3 | 23.2 | 36.2 | 6.7* |
| | | Girls | 61.1 | 26.5 | 41.6 | 20.4* | 35.2 | 22.4 | 31.8 | 21.4 | 9.7 | 50.0 |
| | | Both† | 57.5 | 32.3 | 38.8 | 24.6 | 31.8 | 22.7 | 25.1 | 22.3 | 23.0 | 28.4 |
| | Non-fluoride | Boys | 38.5 | 8.8 | 58.4 | 32.0 | 72.2 | 30.7 | 30.4 | 68.8* | 45.5* | 100.0* |
| | | Girls | 20.0* | 17.4 | 28.6 | 30.4* | 21.4* | 29.4* | 83.4 | — | 38.1 | 100.0* |
| | | Both† | 29.3 | 13.1 | 43.5 | 31.2 | 46.8 | 30.1 | 56.9 | 68.3‡ | 41.8 | 100.0 |

*Findings based on only one age group.
†Simple arithmetic mean of sex-specific rates.
‡Findings based on only one sex.

exposed nearly all their lives (5 to 9 years). Among children 10 to 14 years of age at the time of survey, those exposed all their lives in the fluoride area average 26.7 attacked deciduous teeth, while the corresponding rate for children of the same ages exposed 5 to 9 years is 35.4. These findings suggest that a lifetime exposure in the fluoride area perhaps provides only a slightly higher degree of protection against caries than exposure begun shortly after birth (Fig. 3).

For migrants into the nonfluoride area, the effects of exposure to the drinking water also are evident in the deciduous teeth, and this suggests the presence of noxious factors in that water. The findings on migrants 5 to 9 years of age at the time of the survey are not consistent. However, for migrants 10 to 14 years of age at the time of the survey, those exposed the longest time, 5 to 9 years, have nearly 66 carious or filled deciduous teeth per 100 deciduous teeth present, whereas migrants of the same age exposed only 0 to 4 years average fewer than 46 attacked deciduous teeth per 100 deciduous teeth present.

***Permanent Teeth of Migrants.***—By referring again to Table 3 and then to Figure 4, it becomes clear that migrants into the fluoride area who consume the city water have DMF prevalence rates consistently higher at every age than children also taking the same water but born and reared in the same area. But the caries prevalence rates of these migrants




NUMBERS ON TOP OF COLUMNS = CARIOUS AND FILLED DECIDUOUS TEETH PER 100 D TEETH PRESENT IN MOUTH

*Fig. 3.—Relation between number of carious and filled deciduous teeth per 100 deciduous teeth present and duration of exposure in specified areas*

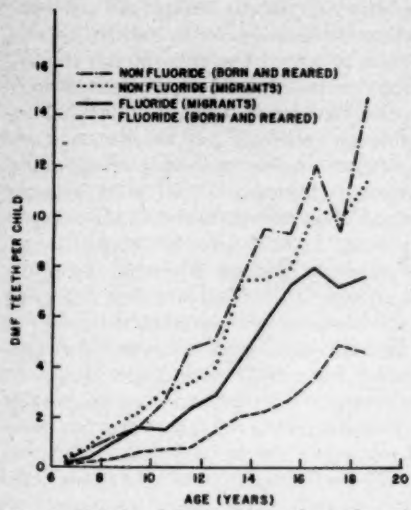



*Fig. 4.—Relation between age and number of DMF teeth per child*

are consistently below those of children born and reared in the nonfluoride area. On the other hand migrants into the nonfluoride area have rates consistently higher than migrants into the fluoride area. For all ages considered together, the migrants into the fluoride area average 3.9 DMF teeth per child. For contrast, the corresponding rate for children born and reared in the fluoride area (and drinking city water) is 1.9 and for native-born children of the nonfluoride area 6.3 DMF teeth.

As shown graphically in Figure 5, which was plotted from the material given in Table 5, children coming into the fluoride area, 5 to 9 years of age at the time of survey, who have been exposed to the fluoride city water for 5 to 9 years average 5.5 DMF teeth per 100 person-years of age.[8] On the other hand, migrants of the same ages exposed only 0 to 4 years show a caries incidence rate more than a third higher (8.6 DMF teeth per 100 person-years of age). For migrants 10 to 14 years of age at the time of survey, those who have been in the fluoride area the shortest time (0 to 4 years) average the highest incidence rate (36.7), and those in the area the longest time (10 to 14 years) average the lowest rate (15.5). For older migrants 15 to 19 years of age at the time of survey, those in the area the longest time (10 to 14 years) have the lowest rate (33.3), whereas those in the area the shortest time (0 to 4 years) have the highest rate (56.6). These several findings may be interpreted to indicate that children do not need to be born in the fluoride area in order to experience protection against caries attack, but the sooner they arrive in the area after they are born the more they are protected.

As indicated by other material shown in Table 5 and Figure 5, a strikingly different picture is presented by migrants into the nonfluoride area. The findings are such as to suggest that just as there are inhibitory factors in drinking water which decrease the rate of caries attack, there may be accelerating factors in other drinking waters which increase that rate.

For migrants coming into the nonfluoride area and to whom the city water supply is available, those who have been in the area the shortest time have the best teeth, while those who have stayed the longest time have the worst teeth. As shown by the data in Table 5 and Figure 5 for migrants into the nonfluoride area 10 to 14 years of age at the time of survey, those in the area 0 to 4 years average 37.6 DMF teeth per 100 person-years of age, those in the area 5 to 9 years average 44.3, while migrants of the same age who have lived in the area 10 to 14 years average the most DMF teeth per 100 person-years of age (57.5). Among migrants to the nonfluoride area 15 to 19 years of age at the time of survey, those in the area the

8. All rates given previously have been prevalence rates, which represent the amount of caries experience accumulated up to given ages. The present rate is an incidence rate which represents the amount of caries experienced per 100 person-years of age over the span of years up to the specified ages.

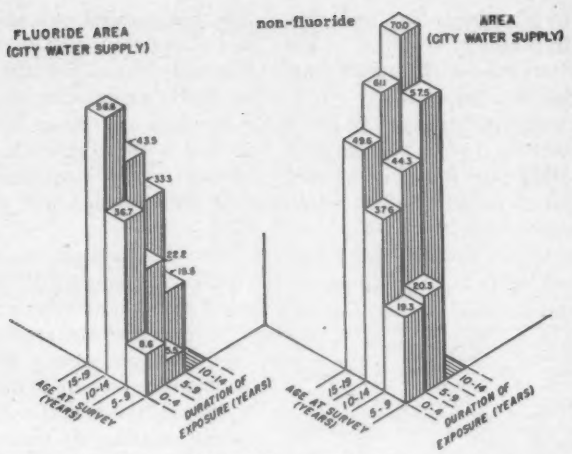



*Fig. 5.—Number of DMF teeth per 100 person-years of age among migrants to specified areas by duration of exposure in the areas and by age at time of survey*

shortest time have the best teeth (49.6 DMF teeth per 100 person-years of age) and those in the area the longest time have the worst teeth (70.0 DMF teeth per 100 person-years of age) for the age-group.

The contrast between the favorable effect of the fluoride area on the one hand and the deleterious character of the nonfluoride area on the other for migrants and for lifetime residents is summarized in Figure 6 for 10 to 14 year old children. It can be noted that children who have migrated into the fluoride area and have been there the longest time have the lowest attack rate (15.5), a rate only a little higher than that of lifetime residents (11.5) of the same age, while the children who have migrated to the nonfluoride area and have been there the longest time have the highest caries attack rate (57.2), a rate only a little higher than that of lifetime residents (50.1) of the same ages.

## Discussion

The findings given in the present report provide several facets of new information regarding the inhibiting effects of fluoride-bearing waters on dental caries. Additional information derived from a nonfluoride area in close geographic proximity raises the question whether other waters may bear principles which favor caries attack.

Examination of both deciduous and permanent teeth of children of school ages born and reared in the fluoride area indicates clearly that residence in such an area in New Jersey is associated with low caries attack rates in the teeth of both the deciduous and permanent dentitions.

It is clear that children need not be born in the fluoride area to experience the protection associated with residence in that area. The earlier in age they arrive and the longer they are exposed, the greater is the protection they experience.

The implications of these findings are apparent for other localities where the addition of fluorides to city water supplies now is being accomplished or planned. For areas where fluorination has been started, it would be reasonable to predict that favorable effects will appear and be measurable in both the de-

ciduous and permanent teeth of preschool children and in children of the early elementary grades within two years after fluorination is begun.

It has been shown[9-11] that dental caries is a family matter; that is, parents with the highest DMF rates for their age have children who show the highest rates, whereas parents with the lowest rates have children who average the lowest rates for their ages. Such findings suggest that familial susceptibility exists in dental caries. This factor may be dominant in determining the ultimate level of DMF experience when adulthood is reached. However, the findings described here make it clear that a trace element in drinking water can superimpose its influence and affect the DMF rate.

These considerations apply perhaps equally to the opposite findings encountered in the nonfluoride area where the earlier the migrants arrive and the longer they stay the greater becomes the intensity of attack by dental caries. Clinical examination of the children exposed to the nonfluoride waters and findings

9. Klein, Henry, and Palmer, C. E., Studies on Dental Caries. V. Familial Resemblance in Caries Experience of Siblings. *Pub. Health Rep.* 53:1353 (August 5) 1938.
10. Klein, Henry, The Family and Dental Disease. IV. Dental Disease (DMF) Experience in Parents and Offspring. *J.A.D.A.* 33:735 (June 1) 1946.
11. Klein, Henry, The Family and Dental Disease. V. Caries Experience among Parents and Offspring Exposed to Drinking Water Containing Fluoride. *Pub. Health Rep.* 62:1247 (August 29) 1947.

**Table 5.—Number of DMF teeth per 100 person-years of age for migrants into specified areas**

| Age group | Sex | Area (city water) | Duration of exposure (years) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 5-9 | Boys | Fluoride | 10.8 | 4.4 | 8.3 | 5.3 | 5.8 | 2.2 | 20.8 | 0.0 | 0.0 | — | — | — | — | — | — |
| | | Nonfluoride | 12.7 | 29.0 | 11.1 | 14.3 | 10.3 | 17.9 | 28.6 | — | — | — | — | — | — | — | — |
| | Girls | Fluoride | 12.7 | 8.9 | 14.6 | 6.2 | 9.0 | 6.0 | 8.9 | 5.6 | 0.0 | 0.0 | — | — | — | — | — |
| | | Nonfluoride | 14.7 | 34.8 | 30.4 | 17.7 | 19.0 | 12.5 | 22.2 | — | 11.1 | — | — | — | — | — | — |
| | Both* | Fluoride | 11.8 | 6.7 | 11.5 | 5.8 | 7.4 | 4.1 | 14.9 | 2.8 | 0.0 | — | — | — | — | — | — |
| | | Nonfluoride | 13.7 | 31.4 | 20.8 | 16.0 | 14.7 | 15.2 | 25.4 | — | — | — | — | — | — | — | — |
| 10-14 | Boys | Fluoride | 31.7 | 37.7 | 24.5 | 28.3 | 24.8 | 33.1 | 24.1 | 16.2 | 14.4 | 17.4 | 12.5 | 6.3 | 4.8 | — | — |
| | | Nonfluoride | 47.6 | 37.3 | 33.3 | 38.5 | 22.4 | 11.1 | 23.5 | 43.2 | 42.4 | 67.7 | 92.3 | 16.7 | 84.6 | — | — |
| | Girls | Fluoride | 60.0 | 39.7 | 31.1 | 54.4 | 34.4 | 24.2 | 26.3 | 20.2 | 18.0 | 28.4 | 31.3 | 23.7 | 14.5 | 14.3 | 0.0 |
| | | Nonfluoride | 22.2 | 47.6 | 55.8 | — | 37.1 | 61.5 | 18.2 | 55.4 | 34.8 | 84.6 | 20.8 | 100.0 | — | 53.8 | — |
| | Both* | Fluoride | 45.9 | 38.7 | 27.8 | 41.4 | 29.6 | 28.7 | 25.2 | 18.2 | 16.2 | 22.9 | 21.9 | 15.0 | 9.7 | — | — |
| | | Nonfluoride | 33.4 | 42.5 | 44.6 | — | 29.8 | 36.3 | 20.9 | 49.3 | 38.6 | 76.2 | 56.6 | 58.4 | — | — | — |
| 15-19 | Boys | Fluoride | 52.2 | 125.0 | 48.6 | 28.1 | 50.0 | 48.3 | 30.8 | 28.4 | 57.7 | 28.6 | 14.9 | 41.2 | 23.3 | 22.7 | 29.6 |
| | | Nonfluoride | 50.0 | 56.2 | — | 42.2 | 44.9 | 96.9 | 42.4 | — | 31.2 | — | 47.1 | 100.0 | — | 64.5 | — |
| | Girls | Fluoride | 50.0 | 43.5 | 56.3 | 57.0 | 55.1 | 58.7 | 51.9 | 43.7 | 40.0 | 46.9 | 46.3 | 45.9 | 27.1 | 25.3 | 56.1 |
| | | Nonfluoride | — | 87.5 | 33.3 | 53.1 | 13.2 | — | — | 73.8 | — | — | 100.0 | — | 6.2 | 68.3 | 50.0 |
| | Both* | Fluoride | 51.1 | 84.3 | 52.5 | 42.6 | 52.6 | 53.5 | 41.4 | 36.1 | 48.9 | 37.8 | 30.6 | 43.6 | 25.2 | 24.0 | 46.9 |
| | | Nonfluoride | — | 71.9 | — | 47.7 | 29.1 | — | — | — | — | — | 73.6 | — | — | 66.4 | — |
| All | All† | Fluoride | 36.3 | 43.2 | 30.6 | 29.9 | 29.9 | 25.4 | 27.2 | 19.0 | 21.7 | 30.4 | 26.3 | 29.1 | 17.5 | 24.0 | 42.9 |
| | | Nonfluoride | 23.4 | 48.6 | 32.7 | 31.9 | 24.5 | 25.8 | 23.2 | 49.3 | 38.6 | 76.2 | 65.1 | 58.4 | — | 66.4 | — |

*Simple arithmetic mean of sex-specific rates.
†Simple arithmetic mean of age-specific rates.

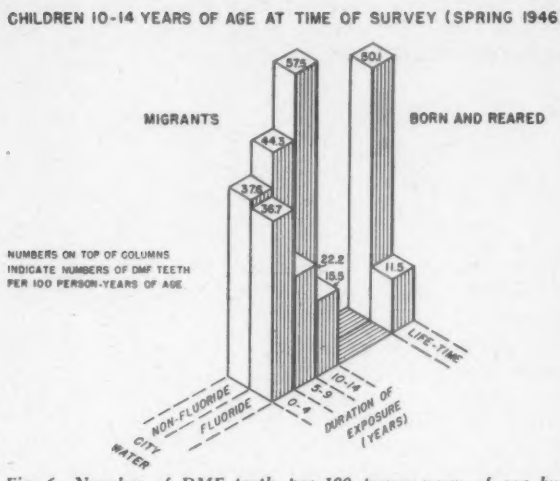



*Fig. 6.—Number of DMF teeth per 100 person-years of age by duration of exposure for children of specified ages and specified areas*

on the individual teeth suggest that there may be something in the water which favors the dissolution of the calcium salts in the enamel. These latter findings (to be published in a later report) show that the upper anterior teeth of children in the nonfluoride area are profoundly involved with caries. A large proportion of the children of high school age show large black and yellow stained crescent-shaped cavities on all proximal surfaces of all the six upper anterior teeth and, in many instances, in the lower anterior teeth as well.

## Conclusion

The findings described here may be viewed as proof that fluorination (accidental) of a community water supply with 1.2 to 2.2 p.p.m. of naturally occurring fluoride salts results in a marked reduction in the incidence and prevalence of dental decay in persons born in or migrating to the area where such waters are consumed. The findings are based on persons exposed as long as nineteen years to the fluoride waters.

It should be pointed out with some emphasis that no observations of a general medical nature were made in the area. Hence a complete elucidation of the general systemic benefits or disadvantages of a fluorinated water cannot be given here. However, it is necessary to recognize that the New Jersey area provides the opportunity for assaying the general medical effects, a problem which is actively under consideration in several areas where sodium fluoride is being added to community water supplies. Significant findings in these directions may be anticipated through medical observations which now may be made after nineteen years of exposure of a population to fluoride-bearing waters in New Jersey.

# BALANCED OCCLUSION FOR FULL DENTURES

The Central Nebraska Study Club

THE MOST IMPORTANT FACTOR in the construction of full dentures is balanced functional occlusion. Balanced functional occlusion bears a direct relation to each temporomandibular joint, and the occlusion in full dentures must be in harmony with all parts involved if the dentures are to be comfortable and stable. If dentures are constructed properly in coordination with all mandibular movements they will preserve the health and function of the joint and ridge.

The technic to be described embodies the arrangement and correction of the teeth and brings about proper relation between the muscular development, the temporomandibular joint and the path of travel of the mandible. A few variations are offered which simplify the technic.[1] These variations make it possible to process and finish both dentures at the same time and to perform the cusp and sulci analysis and generate the cuspal path on the lower processed denture. Dentures thrown out of balance by relining also can be balanced in the manner described here.

First, it must be assumed that the edentulous ridges have been prepared properly, good impressions taken and stone casts made from these impressions. Construct well fitted base plates and brace them with wire that is rigid enough to resist bending.

## Wax Rims

Mount and lute hard wax rims on the base plates. These rims should have a good occlusal relation and should be approximately ½ inch wide on the occlusal surface The wax rims are tried in the patient's mouth and further adjustments are made for desired vertical dimension and occlusal curve. The approximate occlusal curve is established by trimming the wax rims until they maintain a fair degree of contact in the lateral and protrusive movements while in the patient's mouth. Mark the median line. With a pair of locked dividers make indentations in the median line on the wax rims (Fig. 1) so the vertical dimension can be checked later.

## Occlusal Path

The primary occlusal curve is generated in soft wax according to the method of Meyer[2] as follows:

Shorten the vertical dimension of each hard wax rim 2 mm. (Fig. 2) and add 3 mm. of soft counter wax to each rim. Add a .001 in. thickness of tin foil to the counter wax surfaces to prevent the rims from sticking together. Spread petrolatum on the surface of the tin foil and return the wax rims to the mouth. After waiting about five minutes for the counter wax to assume mouth tempera-

Presented before the Section on Full Denture Prosthesis, eighty-eighth meeting of the American Dental Association, Boston, August 6, 1947.

The following are the members of the Central Nebraska Study Club: Leo R. Beattie, D.D.S.; J. G. Colgan, D.D.S.; F. T. Daly, D.D.S.; G. V. Reynolds, D.D.S.; A. T. Ridder, D.D.S.; L. E. Sayles, D.D.S.; and A. R. Transue, D.D.S.

1. Central Nebraska Study Club, Complete Denture Service with Balanced Functional Occlusion. *J.A.D.A.* 30:366 (March 1) 1943.

2. Meyer, F. S., Balanced and Functional Occlusion in Relation to Denture Work. *J.A.D.A.* 22::1156 (July) 1935.

*Fig. 1.—Marks are made on face of bite rims with locked dividers. Return to original vertical dimension is verified by dividers*

ture, instruct the patient to close and slide the jaws in the various lateral and protrusive positions with sufficient pressure to generate an occlusal path in the soft wax surfaces. The path thus generated is individual for each patient and is in complete harmony with the condylar movements. Check with the locked dividers to see that the predetermined vertical dimension has been reached (Fig. 1). It should be kept in mind that each person has a different occlusal path.

Establish rest centric relation on these functional occlusal wax paths as follows:

Trim some of the wax from the labial aspect of the lower path so that the occlusal surface of the upper tin-foiled wax rim is partially in view when the jaws are near centric. By means of a warm explorer, mark the median line on the labial aspect of the lower rim. Tip the patient's head back and instruct him to close in the most retruded position. Make a slight indentation with the explorer in the upper tin-foiled rim just above the median line marked on the lower path. Then return the head to an upright and comfortable position and instruct the patient to swallow. If the patient comes to rest at the same point and is comfortable, this in all probability is his true rest centric. In some cases the rest point with the head in upright position will be slightly anterior to the most retruded position (Fig 3, left). This slightly anterior point is the rest centric. It is an established fact that the patient, after generating the occlusal path, and if sitting in a comfortable position, will usually come to his working or rest centric position voluntarily because the muscles of mastication will have reached the fatigue point. The wax rims with their generated primary occlusal wax paths are removed from the mouth and chilled in cold water. The bow bite fork is heated and luted to the upper wax rim well above the soft wax path and chilled. The head of the condyle is marked by a dot made with a skin pencil on each side of the patient's face. This point usually is found about 11 mm. anterior to the tragus of the ear. The wax rims are replaced and seated securely in the patient's mouth with care to prevent distortion of the soft wax path. When the patient slides his jaws into the pre-

*Fig. 2.—Two millimeters of hard wax is removed from occlusal surface of each bite rim*

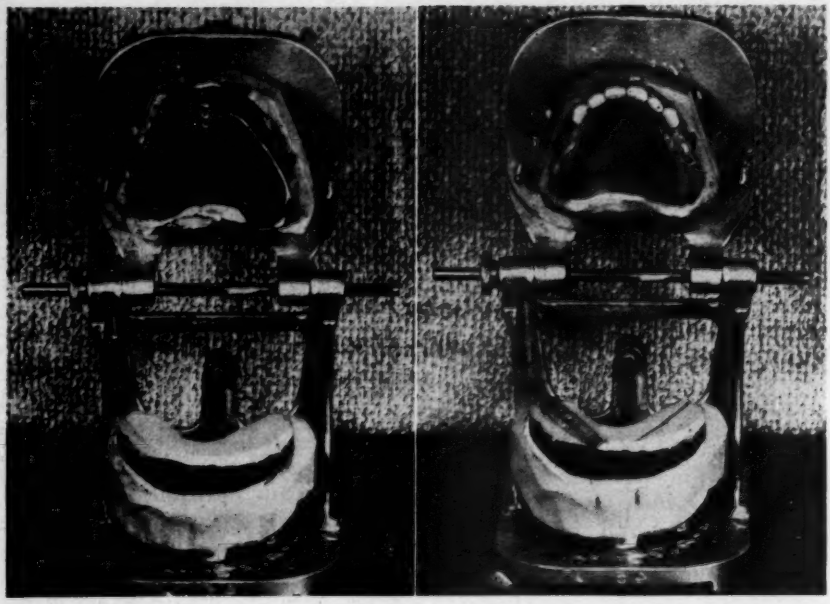


*Fig. 3.—Left: Upper bite rim, showing two indentations, the anterior one representing rest or unstrained centric relation. Lower occlusal curve or path reproduced in artificial stone. Right: Lines are drawn on lower stone path directly over center of ridge*

determined rest centric relation, the wax paths are stapled together and a face-bow transfer is made to a strong and rigid plane line articulator.

A reproduction of the lower soft wax occlusal path is made in stone (Fig 3, left) as follows: Fit an upper base plate to the lower cast and place on it a mixture of stone. Spread petrolatum on the upper tin-foiled wax rim (which is on the upper cast) and close the articulator down to vertical dimension. The individual functional occlusal path now has been reproduced in stone on the lower cast and is indestructible when setting the upper teeth to this path.

### Setting the Teeth

After the stone has set remove the upper base plate and wax rim from the upper cast, and cut off the tin-foil, soft wax and enough hard wax to set the upper teeth. Set the upper teeth to the stone path. As an aid in setting the upper posterior teeth, lines are drawn on the stone path over the crest of the lower ridge (Fig. 3, right). To accomplish this the base plate and its attached stone path are removed from the lower cast and, with a straightedge in position over the crest of the lower ridge, a pencil mark is made on the heel and on the anterior part of the cast. The lower base plate with the stone path is replaced on the lower cast and, with the straightedge positioned by the pencil marks, lines are drawn over the crest of the ridge on the stone path.

Set the upper teeth to the stone path so that all of the major cusps touch. Remove the stone path and set the lower teeth to the upper teeth on the wax rim previously used to generate the occlusal path. Set the lower an-

terior teeth first, open the articulator slightly and set the lower posterior teeth, checking to see that the lingual cusps as well as the buccal cusps are well articulated. Return to the mouth for a try-in for esthetics. The anterior teeth can be rearranged if desired for esthetic improvement. If the upper anterior teeth are rearranged and strike the stone path before the posterior teeth do, that part of the stone must be cut away. The long axis of the posterior teeth should be perpendicular to the stone path with the pits and sulci in straight alinement; otherwise, the anatomy of the teeth will be partially destroyed by excessive grinding to procure a balance. If it is necessary to shift the upper posterior teeth in setting the lowers in their proper relation to the lower ridge, the shifting of the uppers must be done against the stone path or the occlusal curve will be lost.

If the try-in shows the proper centric relation, esthetics and vertical dimension, both dentures are processed. After the dentures are processed and polished they are tried in the mouth.

## Cusp and Sulci Analysis

The cusp and sulci analysis, the step most difficult to understand, is the next

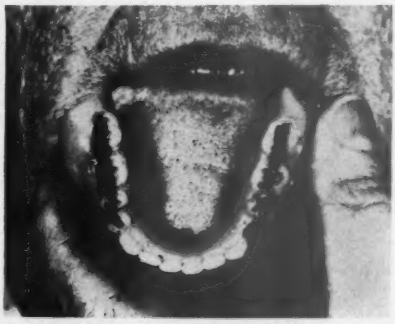


*Fig. 4.—Modeling compound on lower posterior teeth is imprinted with sulci, grooves and marginal ridge markings of upper teeth*

*Fig. 5.—Cuspal paths of upper teeth registered in wax*

procedure. Actually it is very simple, seeming difficult only because it is so different from methods previously used. In his original technic, F. S. Meyer used a lower base plate and compound rim on which to do the cusp and sulci analysis and generate the cuspal path. The method herein described makes use of the lower denture.

To start the cusp and sulci analysis the lower teeth must be dried and a coating of copalite varnish applied to the occlusal surfaces and allowed to dry. A stick of hard compound is heated to the dripping stage and applied in a continuous line on the buccal cusps of the lower teeth. The copalite varnish lutes the compound to the teeth. Seat the upper denture firmly in the mouth. Soften the continuous lines of compound on the buccal cusps of the lower teeth, place the lower denture in the mouth and instruct the patient to close firmly in centric position. A firm biting pressure is maintained for approximately five minutes to seat the dentures securely.

The lower denture is removed from the mouth and chilled, and all the compound is cut away except that part which forms the impressions of the sulci, grooves and marginal ridges of the upper posterior teeth (Fig. 4). The

denture is replaced and the patient is instructed to slide in lateral and protrusive movements. At the point of the lateral movements where the buccal cusps of the upper teeth contact the compound ridge, examine carefully. If it is found that the compound does not contact the tips of the buccal cusps in all places, deepen the corresponding sulcus and groove, add a small amount of compound and correct the impression of the deepened sulcus and groove by asking the patient to close in centric position again while the newly added compound is still warm. Trim away the excess compound. Then examine again in the lateral position.

When the compound ridge contacts all the tips of the buccal cusps on one side, the teeth on the opposite side are balanced in the same manner. The patient should slide into protrusion and retrusion; thus any interfering compound is corrected. Then instruct the patient to slide in all the mandibular movements a few times. This serves to polish the compound ridge, and any interfering compound that was missed in the analysis will be worn away quickly. The cusp and sulci analysis is complete when we find that the patient can slide the mandible in either lateral direction and all the cusps will touch the compound ridge on the working as well as the balancing side.

### Cuspal Path

The lower denture is removed from the mouth and carefully dried, and a compound trough is prepared on the lingual, buccal and labial aspects. Mark the median line on the labial compound. Fill the trough just prepared with cuspal tracing wax to a height slightly above the lower teeth. A good cuspal tracing wax can be made by

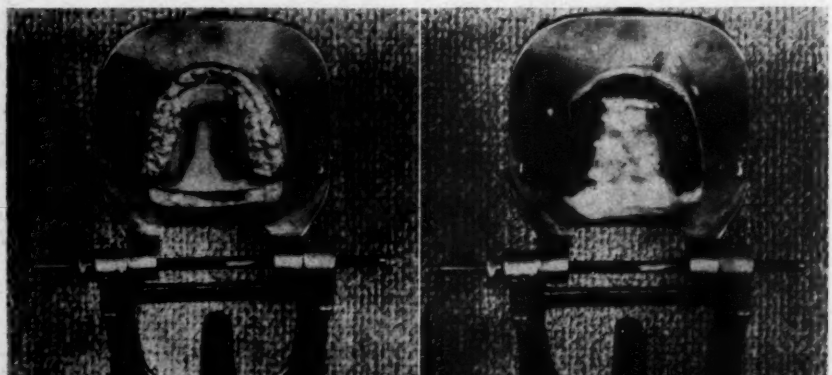


*Fig. 6.—Left: Cuspal paths of upper teeth reproduced in stone. Right: Stone cuspal path record coated with Prussian blue*

mixing one part No. 7 base plate wax (S. S. White Company) and three parts red counter wax. Chill in cold water to avoid distortion of the compound ridge. Chilling the cuspal wax will also serve to lute it securely to the compound trough. Place the denture in the mouth and wait five minutes for the cuspal wax to assume mouth temperature.

The patient should close in centric until the compound ridge shows through the red cuspal wax (Fig. 5). Then the patient should slide in protrusion from centric, maintaining enough pressure to register the incisal and cuspal paths in the soft wax. From centric the patient should slide to the retrusive position a few times, then from centric to the lateral positions until a smooth cuspal path of the upper teeth is generated in the cuspal wax. At the completion of each lateral and protrusive movement, the patient is instructed to open and return to centric without touching the wax. If the wax should tear or pull away from the compound trough or teeth, dry carefully, add a small amount of new wax, and generate the cuspal paths until properly corrected.

Remove the lower denture with its cuspal tracing from the mouth and attach the face-bow fork. The denture and cuspal tracing should be chilled to prevent distortion and returned to the mouth. With the patient closing in centric, a face-bow transfer should be made. By this means the cuspal wax path is mounted, supported by the lower denture, on the articulator. The cuspal path is chilled, carefully boxed and poured in stone. The stone model then is attached to the upper arm of the articulator (Fig. 6, left). After the stone is set, it is chilled thoroughly to aid in separating the cuspal wax from the stone cuspal path. After the wax is separated from the stone cuspal path the excess stone is trimmed away. All the wax and compound is removed from the lower denture and the teeth are thoroughly cleaned. The cuspal stone path is painted with Prussian blue (Fig. 6, right), and the instrument is opened and closed to mark the high spots on the lower teeth. The spots are carefully ground with a small mounted stone until all the major surfaces of the lower teeth touch the cuspal stone path.

*Fig. 7.—Completed dentures in correct functional balance*

A set of dentures in correct functional balance now has been completed (Fig. 7). All of the posterior teeth will touch at the same time in any lateral movements, and the tips of the major cusps of the posterior teeth will touch in the incisive movement.

## Summary

The technic of balanced functional occlusion provides a definite step by step process for the construction of artificial dentures. By it the teeth are set on curves in harmony with the condylar movements of the individual patient. A balance is secured by the final grinding of the lower teeth to a cuspal path generated by the patient acting as his own articulator. At the same time any errors due to processing, wax

shrinkage and faulty occlusion are corrected. By performing the cusp and sulci analysis and generating the cuspal path on the finished dentures, the balancing is done under the actual working conditions to which the denture will be subjected. — *Penney Building, McCook, Nebraska.*

## RELATION OF THE DENTAL LABORATORY CRAFT TO THE DENTAL PROFESSION

Marcus L. Ward, Ann Arbor, Mich.

It is hazardous to discuss the relation of the dental laboratory craft to the dental profession with a view to forecasting future relations between the two. Action on this subject has been evaded for over twenty years, although its increasing importance is recognized.

### Beginnings of Legislation

Soon after World War I American dentistry was warned that technicians and commercial dental laboratories might become as destructive to public and professional interests in this country as they had to those of other countries. Nothing was done about it on this side of the Atlantic, however, until 1944, when Quebec ventured legislation and the American Dental Association adopted a plan of accreditation, thinking that it would work much the same as did the accreditation of dental schools. The subsequent enactment of legislation in 1946 in Ontario and South Carolina seems to indicate that there will be some general action on one plan or the other, or both of them, in the near future.

Since dentistry generally is not aware of what is taking place, previously has been prejudiced against legislation and has recognized no obligation to do for the dental laboratory craft what it has done for hygienists, assistants, nurses and executive secretaries, constructive action is going to require courage, foresight and fidelity to the principles on which the profession must endure. Moreover, it will require the venturesomeness of the *Reader's Digest* schoolteacher who, when accused of "sticking his neck out" with experimental methods, replied that his pupils had brought a turtle into the school room, and as he watched them play with it, he noticed that when the turtle did not stick his neck out he did not go anywhere.

When Michigan attempted to develop legislation prescribing the relations between the dental profession and the dental laboratory craft, there was scarcely a thing on record to utilize as a guide. Dentistry in the United States had been opposed to legislation; consequently, it had done nothing to develop it. The only laws on this side of the Atlantic in Quebec, Ontario and South Carolina, provide mainly a framework for licensing technicians and leave the details of operation to be worked out by the licensing boards. Michigan realized when it undertook

Read before a meeting of the Dental Laboratory Institute of America on February 5, 1948.

Dean emeritus and professor emeritus, School of Dentistry, University of Michigan.

legislation that it was "sticking its neck out," but it was done in the spirit of the schoolteacher in the hope that some contributions might be made to the solution of a problem a quarter of a century old and approaching a crisis in some of the large cities of the United States.

### Early Days of Dentistry

During the early days of dentistry in most countries, there was no definite separation between the dental surgeon and the dental technician. As dental service became appreciated and more widely known, codes of ethics were adopted by the dental surgeons, and laws were enacted establishing qualifications for practice. Although Alabama passed a dental law in 1840, it was not until 1900 that laws requiring graduation from a dental school and a license obtained by examination as qualifications for practice became general. Previous to 1900 commercial dental laboratories were practically unknown; there were only fourteen in the United States that year. With so few commercial laboratories there were no demands for recognition, no laws relating to laboratories or technicians and no codes of ethics for them. As the demand for dental service increased, technicians and laboratories increased at a rate apparently not generally known by the profession nor by many in the laboratory craft. As the number of laboratories and technicians increased they organized into rival groups in some places, Michigan being one of them.

### Laboratory Owners

Since many of these commercial laboratories developed a large business with an expensive staff and extensive equipment, their owners, whether or not they were technicians themselves, acquired a different status from that of the technicians who were not laboratory owners but who worked in the laboratory. The owners had a responsibility, an investment and a reputation that the technicians did not have to the same degree, if at all. This status of the owners of laboratories has, with some exceptions, caused them to adopt a good code of ethics and to solicit cooperation with the dental profession. The organization of owners into groups, when in many cases the owner is no better technician than some of his employees or may not be a technician, has caused a good many technicians to become jealous. Some of these technicians have denounced the dental profession, the state licensing board and the owners of the larger laboratories, and have no code of ethics. There is a typical labor problem within the dental laboratory craft with rival organizations introducing legislation, and the organized profession advocating accreditation and advising states to get approval of the American Dental Association before introducing legislation.

### Distinctions and Decisions

After dental laws regarding qualifications for practice became general about 1900, a difference was established between the dental surgeon and the technician. Today the technician makes a distinction between himself and the laboratory owners. In addition to these general trends, the owner of the small laboratory sometimes condemns the owner of the larger one. The president of the technicians' society in Michigan said that the larger beltline production laboratories should be put out of business because they were unfair. In answer to questioning, he stated that the beltline laboratory could turn out more work, do it cheaper, make more money, and afford to employ higher priced technicians than the neighborhood laboratory could.

This organized opposition of the technicians to the owners, and the opposition of the small laboratories to the large ones, presented a problem in Michigan for both the profession and the owners of laboratories. When this situation was made known to dentistry, four decisions were made promptly. The first was not to let the technicians and laboratory owners fight it out to their satisfaction or dismay without intervention by the profession. The second was that accreditation could not handle the problem in Michigan. The third was to deal with the Michigan Dental Laboratory Guild until the technicians' society provided a different kind of leadership. The fourth was to assure the technicians that dentistry was interested in the regulation, development and maintenance of a laboratory craft on a basis similar to that of other auxiliary services and that the interests of the technicians would be protected.

The decision to deal for the present with the Michigan Dental Laboratory Guild increased the antagonism of the belligerent element among the technicians to the extent that they said they wanted no participation in their affairs by the state licensing board of the state dental society. One of their circulars contained the following: "We should be able to appoint our own examining board, make our own laws, and formulate our own amendments as time goes on—in other words, to make mechanical dentistry an entirely separate and closed craft." We have been informed that a similar situation exists in other states and is about ready to explode, just as it did in Michigan.

## Topics for Discussion

This discussion of the situation will cover the following points:

1. Data on the increase in the number of laboratories and technicians.
2. Dentistry's experiences with laboratories and technicians after World War I.
3. Warning by the Carnegie Foundation of the dangers inherent in failure to recognize a problem that was increasing in importance.
4. Study of the situation by the American College of Dentists.
5. Consideration of the results of the study made by the American College of Dentists and the adoption of accreditation.
6. Actions of the American Dental Association, the American Association of Dental Schools and the American Association of Dental Examiners.
7. Questions which should be considered before an attempt is made to write a law to regulate and maintain a laboratory technician craft.

## Increase of Laboratories and Technicians

In 1890 there were only two known commercial laboratories in the United States. In 1900 there were fourteen, an increase of twelve in ten years. In 1920 there were one hundred, an increase of eighty-six in ten years. In 1930 there were 3,400, an increase of 3,300 in ten years. In August 1947, the Council on Education of the American Dental Association reported a total of 5,077 as of July 1, an increase of 1,677 in 17 years. Although there has been a constant increase in the number of commercial laboratories, the greatest percentage increase took place after World War I. We have a similar, but apparently much worse, situation developing after World War II. It is summarized as follows by the Council on Education of the American Dental Association in the January 1948 issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION:

As of July 10, 1947, thirty schools and 2,178 laboratories and dental offices have been approved under Public Law 346 or have contracts

or agreements with the Veterans Administration to offer training for dental technicians. The thirty schools in twenty-four commercial and six non-profit institutions enroll 2,898 students, and the 2,178 laboratories and dental offices offer training to 5,360 students, a total in training of 8,258. The table shows by states the number and enrollment in the schools, the number of approved laboratory and dental offices and the number of students being instructed in them, the number of dentists in each state and the ratio of students in training in mechanical dentistry to dentists.

It will be observed that the ratio of students to dentists for the country as a whole is 1 to 9.2; for the four states of Massachusetts, New Jersey, New York and Pennsylvania, 1 to 4, and for all other states, 1 to 20.5. Thus, four states with 24 per cent of the population of the nation and 31 per cent of the dentists enroll 69 per cent of all the students in training in mechanical dentistry.

## Necessary Regulations

The data given for the four states with respect to the numbers of technicians probably can be equalled in large cities in other states. This situation seems certain to result in an increase in the number of violations of the dental practice acts and to confront the responsible laboratories with a type of competition that is not in the interest of either the public or the profession. Dentistry not only has ignored this rapidly developing duplication of conditions in Germany but it has developed within it a considerable number of law violators who have encouraged patients to go directly to laboratories for service and who have become so incompetent that they have to rely on the laboratories for advice on what should be done in laboratory work. With part of the profession showing indifference toward the result of such practice, law enforcement would become more and more difficult, even if there were no great increase in the number of technicians.

The problem before us, therefore, involves not only an oversupply of jobless technicians but a number of law violating, incompetent members of the profession, and a rapidly growing craft which the profession did nothing about regulating until it approved accreditation in 1944. The best law that can be written by dentistry and the responsible laboratory owners probably cannot be enforced in the large cities by any law-enforcing agency in existence until at least the following recommendations have been adopted:

1. The licensing boards should be given more financial assistance.

2. The licensing boards should be supported in court by a large number of dentists so as to show the courts that the profession, not merely some member of the board; is interested.

3. Organized dentistry must find some way to eliminate incompetents and law violators from the profession.

4. Dentistry must establish standards for the preservation, regulation and further development of the laboratories which have, through observation of the needs of the profession and conformity to a good code of ethics, made themselves a valuable auxiliary service. The craft must realize, however, that it is a part of dentistry and that the profession has increasing obligations in the field of health preservation and has law enforcing agencies that will not be helped by a rival independent group.

5. The laboratory owners with the support of the profession must interest themselves in the welfare of the better technicians who may deserve to have their status improved.

## Formation of Policies

Considering the attitude of those in control of American Dental Association policies since 1929 when policies of any nature began to form, we cannot expect general support for these changes or for legislation to improve the situation at

the present time; the Association is committed to accreditation. On the other hand, we cannot expect states that have a problem, obviously uncontrollable by accreditation, to disregard legislation, especially when both technicians and owners of laboratories have bills in their legislatures. States with large cities like Detroit, where labor leaders are urging technicians to affiliate, will have the most difficulties. The possibility of affiliation with labor is a vital thing for the laboratories to consider when they are advocating a status independent of dentistry. The moment the laboratories become anything but a facility for furnishing health service under the same education and law enforcing agencies as dentistry, they lose their prestige and their ability to enforce their own regulations, and subject themselves to the hazards of industry. They are, under these conditions, no longer a part of a profession and must exist on their resources.

### Training of Technicians

There are some who believe that dentistry has made a mistake in allowing the laboratories to develop such importance to the profession and that the mistake can be corrected by training technicians for the dental offices. There are at the present time three dental schools[1] pursuing such a course and others are interested. Whether graduates of these technician departments of dental schools are capable of going into the laboratories is questionable. Other members of the profession believe that the dentists should get together in groups of from four to eight and employ a technician under their own control. The laboratories regard this idea as detrimental to them and oppose it vigorously.

Our studies of the situation indicate that a majority of dentists would prefer not to have the responsibility of employing a technician, either alone or with others, and maintaining the facilities necessary for his work. After World War I three dental schools attempted to train technicians. Northwestern's course was established at the request of the United States Government Vocational Training Bureau and was continued as long as there were any members of the Veterans Bureau who wished to take it. The course at Minnesota continued for only one year. The dean stated that those who completed the course had difficulty securing positions and had gone into other work. The course at Nebraska was organized and discontinued during the 1925-1926 session. Southern California made an experiment by offering a one year course for technicians previous to World War I, dropped it, then re-established it in 1929.

### Carnegie Foundation Report

At the time these experiments were taking place the Carnegie Foundation was making a survey of dentistry and published a report in 1926. The following was stated in the report:

> Although the need for expert dental technicians is growing rapidly, organized dentistry is doing nothing to meet the emergency. The dental faculties appear to be unanimously unconcerned about it. Meanwhile, superficial proprietary "schools" for "mechanical" dentists are doing business as usual. Adequate courses in good technical schools, if developed under the guidance of local dental societies and with the cooperation of effective dental teachers, would presumably carry the problem toward its ultimate solution.

### Difference of Opinion

A different point of view was taken in 1929 by Henry L. Banzhaf, former president of the American Dental Association and of the American Associa-

1. The Ohio State University, Meharry Medical College and the University of California.

tion of Dental Schools, for a long time dean of the dental school of Marquette University, Milwaukee, and otherwise well known to the profession. Speaking before the American Association of Dental Schools, he said:

> There is, in my opinion, no more valid reason for licensing the dental technician than there would be to license the workman who makes artificial limbs for the physician. I do not believe that the question of offering courses for dental technicians in the dental schools is one that is likely to come up for major consideration for a number of years to come.

We have here two striking differences of opinion expressed by two well known men about the existence of a problem and the part the dental schools should play in its solution.

### Committee Reports

In 1934 the American College of Dentists concluded that there was a problem and appointed a committee to study it. Walter H. Wright, a professor of prosthetic dentistry and a well and favorably known member of the profession, was chairman. He made six reports under the following captions:

1. Shall Dentistry Maintain Its Present Unity
2. Propaganda for License of Laboratory Technicians
3. Laboratory Leaders Criticize Statements by Members of the Profession
4. Dental Trade Advertises Direct to the Public
5. The Prosthetic Dental Service Committee Report

> This report, forty-six printed pages long, contained the following recommendations:
>
> 1. There should be greater vigilance by the profession to prevent the licensing of technicians.
>
> 2. There should be more widespread employment of dental technicians by dentists in their own laboratories.
>
> 3. Widespread appeals should be made to the members of the dental profession to protect the oral health of the public and to discharge their professional responsibilities by refraining from the use of dental technicians as assistants in performing intraoral phases of prosthetic service.
>
> 4. A joint study of the profession-technician relation should be undertaken by a Committee composed of members of the American College of Dentists and representatives of the laboratory technicians.
>
> 5. The College should suggest to the American Association of Dental Schools that they sponsor a study of the need for, and plans for, training, examining, certifying and supervising dental technicians, by the dental profession.
>
> 6. There should be wider distribution to the profession of information on the important question of profession-technician relationship.

6. This report merely informed the American College of Dentists that the American Association of Dental Schools had acted on the suggestion of the College to study and make recommendations concerning the use of dental technicians.

### Two Actions

The two actions taken by the American Association of Dental Schools most relevant to this discussion were as follows:

1. It was recommended that the American Association of Dental Schools join with the American Dental Association and the American College of Dentists in opposing legislative licensure of laboratory technicians.

2. It was recommended that the dental schools and the prosthetic departments train the dental students in making intelligent use of the services of the dental laboratory technicians.

The American Association of Dental Schools has given no further consideration to the matter since 1941, notwithstanding Dr. Gies' suggestion in a paper read before the First District Dental Society of New York in 1938 that funds probably were available for "study and

procedure" if organized dentistry were to show cause for the "study and procedure" and make an effective request for assistance.

### Prosthetic Dental Service Committee

At about the same time that Dr. Wright, representing the American College of Dentists, made his recommendation to the American Association of Dental Schools, he presented to the House of Delegates of the American Dental Association a resolution that a professional relations committee be appointed. The committee was appointed and it reported to the House of Delegates in 1940 under the name of Committee on Prosthetic Dental Service. With the exception of 1942, reports have been made to the trustees and the House of Delegates at each annual meeting. In 1944 this Prosthetic Dental Service Committee recommended that it be made a standing committee, with a budget, and have the approval of the Association for accreditation. In June 1947 a conference was held in Chicago which reportedly was attended by representatives from forty-three states. The results of this conference and of the work of the committee for the year were presented to the House of Delegates of the American Dental Association at the meeting in Boston in August 1947. The report of the Prosthetic Dental Service Committee had fifteen recommendations in it. A supplemental report made at the Boston meeting contained six recommendations. The Board of Trustees presented a report to the House of Delegates in which there were seven disagreements with the recommendations of the Prosthetic Dental Service Committee. The reference committee of the House of Delegates then had its turn at recommending. Its list contained twenty-one recommendations among which was the suggestion that "the accreditation program be placed in operation as soon as possible by all constituent societies."

Another recommendation in this report has such significance as to constitute a landmark in the American Dental Association literature on the subject under discussion; it is an indication of what the relations of the profession and the dental laboratory craft may be in the future.

> It is recommended that no legislation for the regulation and licensure of dental laboratories or dental laboratory technicians be introduced at this time. However, if in the good judgment of the dental societies in the individual states, such legislation is deemed necessary it should conform to the specifications laid down by the Committee on Prosthetic Dental Service of the American Dental Association and approved by the House of Delegates in 1946.

The specifications for legislation that were laid down in 1946 contain three relevant items:

1. The problem of dentist laboratory relations can best be worked out at a state level.
2. When training of dental technicians is initiated in any state such training should be supervised or approved by the state dental society.
3. The state dental societies should draft the most competent men available to deal with the state laboratory organizations in working out this critical problem.

After many years of disapproval by the American College of Dentists, the American Association of Dental Schools and the American Dental Association of legislation involving laboratories and technicians, these actions of the American Dental Association are an admission that legislation on a state level may be necessary.

### Another View

Notwithstanding this changing situation in the American Dental Association, the National Board of Dental

Examiners, steadfast in its former belief, made several unwise recommendations at the August 1947 meeting of the American Dental Association at Boston. This organization held a round-table discussion of the question, "Should the Dental Technicians Be Examined and Certified by the State Boards of Dental Examiners?" The results were reported to the secretary of the association as follows:

> It was the unanimous opinion that the dental technicians should not be examined, certified, or licensed by the state dental boards for the following reasons.
>
> 1. The result of such procedure would be a tendency to lower the prestige of the dental profession.
>
> 2. It is questionable if the courts would uphold licensure of dental technicians, because ordinarily courts will not recognize as a profession a mechanical trade or craft for merchandising. And in reality, a dental technician is a craftsman who does not deal directly with the public and, therefore, assumes no responsibility to the public.
>
> 3. It was generally agreed by all those present that the training of dental technicians by recognized dental schools was undesirable and merely serves to create a chilblain course in dentistry, and will with certainty result in creating a situation which will prove detrimental to the profession.
>
> 4. We, as representatives of our respective boards and the dental profession, must not be remiss in our duty to protect the public and the profession from the insidious efforts of an auxiliary group to establish their own prestige to the detriment of our own profession.

From this action of the examiners we may conclude that they, like a great majority of the dental profession, know little about the friendly relations that have developed between the profession and the laboratory craft in some places in this country. Indeed, it is difficult to understand how these examiners who profess to protect the public and the profession can be so far behind the developments in the American Dental Association. Among the Association's records since 1944 when accreditation was approved, there are some unmistakable signs of a changing policy on the part of dentistry toward the dental laboratory craft.

### State Legislation

Legislation which has been condemned unanimously by dentistry now is approved in states where it is deemed necessary. The talk about a uniform law and approval by the American Dental Association of laws introduced has been displaced by admission that solutions of the problems involved should be worked out on a state level. Approval of invitations to laboratory owners and technicians to attend state dental society meetings has been given. Improvement of the liaison between the profession and the craft has been recommended. If this liaison is improved, dentistry will have to follow the recommendation of the Prosthetic Dental Service Committee of the American Dental Association for 1946 to the effect that state dental societies should draft the most competent men available to deal with the state laboratory organizations in working out this critical problem. Likewise, the dental laboratory craft will have to select men who are capable of understanding the advantages accruing from the craft's status as a service which is auxiliary to dentistry rather than as an independent business.

When groups of this kind undertake the improvement of the liaison between dentistry and the dental laboratory craft, they may as well begin with consideration of the following two fundamental questions.

First, is legislation necessary in the state, or will accreditation meet the needs of both the profession and the craft?

Second, if legislation is regarded as necessary, will the craft cooperate with

the profession through an advisory board as the specialists and hygienists do, or will it insist on an administrative board independent of the profession?

The manner in which these two questions are settled will determine to a great degree how the following twelve will be treated.

1. What is the purpose of a law relating to laboratories and technicians? How will it affect the public, the profession, the laboratory owners and the technicians who are not owners of laboratories? Any state that introduces legislation may expect these questions to be among the first asked by legislators who hold public hearings on proposed legislation.

2. Should a laboratory technician law be a part of the dental law of the state or an independent act?

3. What is the difference between licensure, registration and certification?

4. Should licensure, registration or certification be applied to the laboratories or technicians or to both?

5. Who would administer a laboratory technician law? Should it be an independent board composed of technicians as is almost universally proposed by technicians; a board composed of equal numbers of the profession and technicians as was done in Quebec; a board composed of five persons as was done in Ontario; the state board of dental examiners as was specified in the South Carolina law; the commissioner of education as was proposed in attempted laws in New York; the department of registration as would be done in Illinois, or the state department of health as would be done in Nebraska and Iowa?

6. Who is a dental technician? Is he one who can do denture prosthesis, metal prosthesis, ceramic prosthesis, or all three?

7. What is to be the position of the technician who works in a private office? Does he become subject to the law when he works for a dentist only, a medical group of physicians and dentists, a public institution of a state or one of the philanthropic institutions of a state?

8. What is a dental laboratory? Is it a laboratory where craftsmen do denture prosthesis, metal prosthesis, ceramic prosthesis, or all three divisions of work? Should the owner be a master technician capable of doing all three divisions of work, a senior technician capable of doing two divisions of work or a junior technician capable of doing one division of work? Should the owner be a dentist? May he be a layman, neither technician nor dentist?

9. Should a prescription for work be required? Five of twenty-five state laws examined revealed that written authorization or orders are now required in Minnesota, South Dakota, West Virginia, North Carolina and California. Some states require "prescriptions or orders" but do not state "written authorization or orders." Some states do not make any reference to the matter.

10. How should persons be trained for the craft? Should they be trained by technicians, as provided in the South Carolina law; by dental schools, as is done at the University of California, The Ohio State University and Meharry Medical College and recommended by the American Dental Association; by the dental laboratories, as proposed by technicians; by technical trade schools, as is now done in several places, or by combinations of these, as is done in Quebec?

11. What should be the minimum standard of education and apprenticeship for persons who enter the craft in the future? The South Carolina law requires at least three years' training under a registered technician. The laws in Quebec and Ontario refer the matter to boards to be appointed. The American Dental Association plan of accreditation provides for high school

graduation and two years of training. The Dental Laboratory Association of Chicago and Illinois recommends, but does not require, high school graduation and four years of training. The Michigan Dental Laboratory Guild proposed at least two years of high school education and four years of apprenticeship under a master technician, or training substantially similar thereto, in a school or college accredited by the board of examiners for technicians.

In Sweden, high school graduates are preferred but not required, and training consists of two years of apprenticeship in the laboratory, one year at technical school, or one year of practical laboratory work.

Dental schools, including the three now offering training, probably will prefer to follow American Dental Association recommendations of high school graduation and two years of training. The proprietary schools probably have a variety of requirements.

12. What is the name of the pursuit? The professional and craft literature contain the following: art, business, industry, craft, trade guild, handicraft, profession and technology.

Generally these terms are used in the literature of both the profession and the laboratory craft as though they were synonyms. For example, the Quebec law uses the terms art, business and profession.

### Definition of Terms

In a recent issue of one of the monthly laboratory journals the terms craft and industry both appear in the editorial section. In the December issue of the *Dental Laboratory Institute News* the Dental Laboratory Guild of Texas uses the term trade in an agreement with the Federal Committee on Apprenticeship. Both the profession and the craft apparently have ignored court decisions and administration procedures with regard to the meaning of the terms profession, business, industry, trade and craft. Just as we read the preface of a book to learn what the author claims for it, courts now look at the name of the pursuit and its declaration of policies as first indications of its nature. Under recent interpretations, both literary and legal, the work is classified by the terms used to designate its pursuit. As an example, using Webster's book of synonyms:

*Profession* applies only to a pursuit that requires years of study and training before one is ready to follow it as a means of a livelihood and usually implies devotion to a higher end than personal profit or the earning of a livelihood.

*Industry* applies chiefly to those who are engaged in production on so large a scale that problems of capital and labor are involved.

*Business* specifically applies to the combined activities of all those who are engaged in the barter, purchase or sale of commodities of any sort.

*Trade* is applied chiefly to pursuits involving skilled manual or mechanical labor and the management of machinery or tools.

*Craft* tends to be used for those pursuits that involve not only manual and mechanical labor but mastery of materials and technique.

*Technology* is applied science as contrasted with pure science.

At the present time there is little difference between the terms craft and technology as they affect this discussion. In the proposed Michigan law the word technology was used but it is a clumsy term to use in a discussion like this one so I have used the word craft.

Perhaps those in the craft already have classified themselves with respect to business, industry and trades and are subject to the laws controlling them. If they are in this position, and I suspect they are, they are in conflict with the ideals of a profession.

This presents for consideration by the dental laboratory craft the question, "Do you want to be an auxiliary

service to the dental profession with the resources of the profession to aid you in the maintenance and further development of your craft or do you want to be a comparatively small business, industry or trade existing on your own resources?"

### Need for Cooperation

Judging from what has happened in Michigan since April 1946, it appears that dentistry, notwithstanding its existing cordial relations with the laboratory guild, will not take much interest in the welfare of the dental laboratory craft if it persists in a request for an independent administrative board. Neither will the dental schools have much interest. They cannot assist the craft until the state dental society and the craft have reached an agreement to cooperate.

The craft must realize that the profession and the dental schools are combined to a large degree in postgraduate and extension work. This situation apparently is not well understood by the craft, for dentistry has had requests from the craft for instruction sponsored by the state dental society. The matter was referred to the dental school at the university. The state dental society was asked if it wanted instruction given to the responsible ethical group as well as to the others. For the present the matter has been dropped, not because the dental school is unwilling to develop any needed instruction but because it wants the profession to continue its cooperation with the school and to make a decision about cooperation with the craft. One of the well-known men in the craft, Mr. I. Margoshes, referred to this matter in an article entitled "Who Makes Black Market Dentistry" in *Oral Hygiene*, February 1947. He said in part: "To change the situation, dentistry must cooperate with the ethical dental laboratory in setting up educational institutions for the training of dental technicians on a higher level." Numerous statements written on the same theme by other men well known in the craft may be observed. This appears to be an admission that the craft alone cannot solve the problems under discussion. Neither can the state boards do it alone. It will require good support by the profession and can be done more efficiently, with less expense and effort, if the craft cooperates. Perhaps a brief account of what happened in Michigan in 1946 will help others.

### Michigan Legislation

In April 1946 the Michigan State Dental Society authorized, without a dissenting vote, the appointment of a committee to draft legislation with the cooperation of the Michigan Dental Laboratory Guild. The Executive Council of the state society referred the matter, which was a part of the manpower problem facing the profession, to its Council on Health and Education with a request for information. When the committee to draft legislation was appointed the majority was from the Council on Health and Education because the question was, and still is, considered a vital part of the manpower problem. While the committee was cooperating with one from the Michigan Dental Laboratory Guild attempting to draft legislation the so-called National Dental Technicians' Society introduced a bill in the legislature which was an insult to both the profession and the craft.

The dental laboratory craft notified the state dental society that if it did not hasten the introduction of a bill (the legislature was to adjourn soon) to help defeat the technician bill they, the craft, would present one. The result was that the state dental society and the dental laboratory craft joined

to introduce a bill before either was fully ready. About the same time the state board of examiners sent out an urgent request for the state dental society to introduce a bill raising the annual license fee from three to five dollars before the legislature adjourned. The reason was that violations of the dental practice act were rampant in the city of Detroit and could not be handled with the funds available. This request was fortunate for the profession in Michigan because it promptly secured passage of the bill making more funds available. Dentistry then began to interest itself in violations of the dental law by both the "black market technician" and some of the profession.

### More Knowledge of the Problem

Previously, dentistry outside of the city of Detroit knew very little about law enforcement or employer and employee problems in the craft. Upstate it is much more difficult for law violators in the profession and black market technicians to remain undetected than in Detroit. Consequently, dentistry upstate has had no problem and has been uninterested and uninformed. Until the last year the profession both in Detroit and upstate has had the idea that drafting a law providing for the licensing of technicians and otherwise regulating the craft was a simple matter. However, since the annual licensing fee was raised, indicating that things were not going as they should, both the profession and the craft have become interested and better informed. Moreover, some of the legislators who saw the bill which dentistry introduced, but which did not get beyond consideration of the committee, have been informing themselves and asking some pertinent questions, such as the following:

1. Can peace between employee and employer be expected if a law is administered by a board composed of owners of laboratories?
2. Can the profession and the schools be expected to cooperate in law enforcement and training of technicians if the laboratory craft insists on a status different than other auxiliary services?
3. As long as there is no standard for either an owner of a laboratory or a technician, how can the craft create such standards as will be necessary for regulation, maintenance and future development, unless they become a part of the profession like other auxiliary services?
4. Will standards created outside of the profession give any prestige to the craft within the profession?
5. Can the craft enforce its own standards without the help of the profession in the large cities?

Inasmuch as the legislation which exists in the United States and Canada has been initiated by either technicians or owners of laboratories or both, it would seem advisable for the dental laboratory craft to answer these questions and show what use it proposes to make of a law.

The Dental Laboratory Institute of America published in its journal in July, 1947, a declaration of policies in which it challenged the profession to state its position with respect to its relation with the craft, and stated that the craft, as always, was opposed to professional status.

This does not answer the questions relating to the objections and operation of legislation. It leaves the profession with the bad records of technicians in other countries, and nothing to show that the craft will be different in this country.

Judging from the visitors I have had and the correspondence that has been carried on since the 1947 legislature adjourned, someone will have to an-

swer these questions if legislation is enacted in Michigan. Neither the profession nor the craft gave much attention to these fundamental questions before the 1947 bill was introduced. They were not as fully aware of the menace of needless licensing as are legislators who have had to deal with applications for licenses for painters, plumbers, well drillers, plasterers and watchmakers. Like the legislators, many professional friends of the ethical part of the craft in Michigan want to know how legislation is going to work.

Although we have within dentistry some who think it beneath their dignity to join with the craft in legislation, probably a majority would favor it, if they were not afraid of it as a first step toward an independent status and if they could be shown that legislation would improve existing conditions in either the craft or the profession or both.

## USE OF THE DENTAL DIRECTORY IN EVALUATING PROFESSIONAL RESOURCES: AVAILABILITY OF DENTAL SERVICE

Joseph E. Bagdonas, Chicago

DURING THE PAST TWO DECADES, problems associated with the provision of more adequate dental, medical and hospital care have received the continuous and growing attention of public and professional bodies. In many ways, the question of the availability of personnel and facilities is a major aspect of these problems and has proved to be one of the most vexing. Undoubtedly this problem will continue to face the health professions, statesmen and groups dealing with the public for many years to come.

The need for dentists has proved to be an especially acute problem. Earlier studies on the number and distribution of dentists[1] and on the need for additional dental personnel[2, 3] have served to point up this issue from two approaches. These studies have been accepted as the basis for the development of long range plans to increase the number of available dentists and to make the most effective use of their services for the benefit of the entire population. In addition, they have proved valuable in recent years in the development of dental health program planning and in orienting dentists returning from the armed forces in the selection of locations.

Until 1942, the best available nationwide statistical information on the distribution of dental personnel consisted of data as presented in the decennial reports of the Bureau of the Census.

Formerly secretary of the Committee on Dental Economics, American Dental Association; at present executive assistant, Bureau of Medical Economic Research, American Medical Association.

1. *Distribution of Dentists in the United States.* Chicago: Committee on Dental Economics, American Dental Association, 1946.

2. Morrey, L. W., Dental Personnel. *J.A.D.A.* 32:131 (February 1) 1945.

3. Horner, H. H., Dental Education and Dental Personnel. *J.A.D.A.* 33:872 (July 15) 1946.

This source presents facts only on the number and age of active dentists by states and for cities with populations of at least 100,000. More detailed information on all registered dentists is presented in the report, *Distribution of Dentists in the United States*, published by the American Dental Association. This report was prepared originally by the Committee on Dental Economics in 1942 and was republished in 1946. It presents detailed data on the population, dentists, ratios of population to dentists and changes in population by counties and states to the end of 1943.

Since 1943 additional important shifts in population and dentists have occurred, together with an almost phenomenal increase in the total population. Reports of the Bureau of the Census indicate that the total population of the United States stood at 142,000,000 in 1947—an increase of over 10 million persons in a period of seven years.[4] Because of the continuing need for current information on the distribution of dentists, the Committee on Dental Economics recently undertook a study of available sources for postwar data of this nature. The *American Dental Directory*, recently published by the American Dental Association, was found to offer extremely interesting possibilities for personnel resource analysis as well as for other purposes. Obviously, the directory will receive its greatest use in the fulfillment of the purpose for which it was compiled: as a directory of personal and professional information concerning all of the known dentists in the United States. In this respect, it will be of value to many practicing dentists and dental society executives, as well as to others who want to know where a given dentist is located or what dentists are located in given communities. In addition, its organization and integrated content make it apparent that the directory can be processed statistically for many other purposes.

4. Dept. of Commerce, *Current Population Reports, Population Estimates*. Series P-47, No. 3. Washington, D. C.: U. S. Govt. Printing Office, April 3, 1947.

## County Summary Data

The Committee on Dental Economics developed a record form which might serve a number of purposes and which might prove flexible enough to be adapted to other uses. Figure 1 illustrates the form and indicates the mechanics of posting summary information from the directory. The form can be printed or duplicated on 5 by 8 inch card stock for use as an index card. Other information has been posted from the 1940 census reports, from the earlier report on distribution of dentists and from another source[5] on estimated family incomes in 1946.

The procedure in compiling county summary data from the directory involved the following steps:

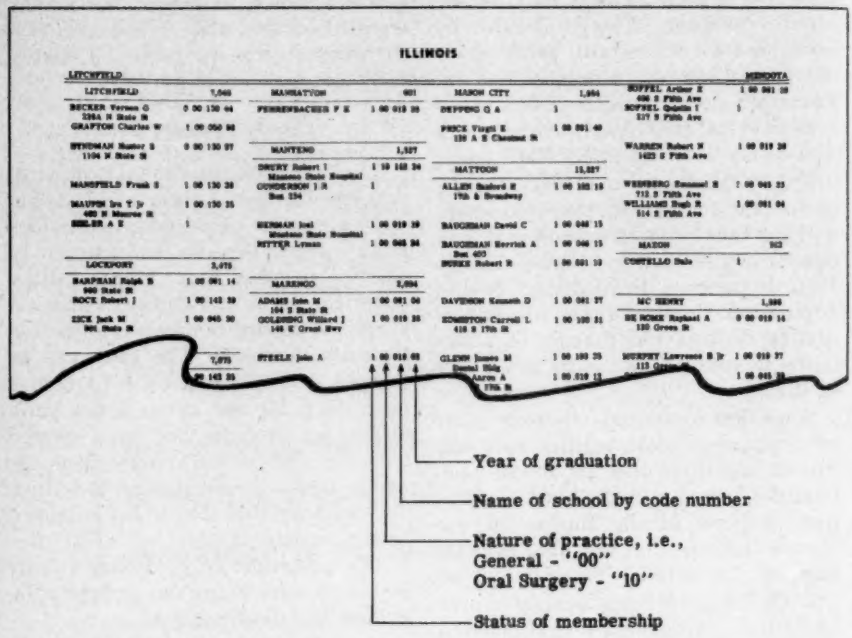
1. Coding each community in the directory by the county in which it is located. *The U. S. Official Postal Guide* is a ready source to use in identifying counties for practically all communities.

2. Counting the number of dentists listed under each community and posting the totals in the heading for ready reference. The community heading in the directory already provides information as to the population, based on 1940 Census figures.

3. Posting the summary data to county cards as shown in the sample.

4. Checking the names of communities reported to have dentists against a standard reference such as the Census reports to ascertain additional communities of each given population size which do not have dentists. These communities might be posted with some special identification on the county cards.

5. Survey of Buying Power Number. *Sales Management* 58:10 (May 10) 1947.




| State ILL. | County Will | | Pop. '47 | DDS '47 63 | Ratio '47 1941-42 | DDS '41 68 | Pop. '40 114-2 | Fam. Income '46 3-2 | Main City | |
|---|---|---|---|---|---|---|---|---|---|---|
| Size | Cities | Dentists | Under 1,000 | No. 2 | DDS 2 | 2,5-4,999 | No. 1 | DDS 3 | 25-49,999 | No. 1 DDS 54 |
| Total | 7 | 63 | Manhatton | 1 | | Lockport | | 3 | Joliet | 54 |
| Under 1,000 | 2 | 2 | New Lenox | 1 | | | | | | |
| 1,0-2,4 | 3 | 4 | | | | | | | 50-99,999 | No. DDS |
| 2,5-4,9 | 1 | 3 | | | | | No. | DDS | | |
| 5,0-9,9 | | | | | | 5-9,999 | | | | |
| 10,0-24,9 | | | | | | | | | 100-249,999 | No. DDS |
| 25,0-49,9 | 1 | 54 | 1-2,499 | No. 3 | DDS 4 | | | | | |
| 50,0-99,9 | | | Peotone | | 1 | | | | 250-499,999 | No. DDS |
| 100,0-249,9 | | | Plainfield | | 1 | | | | | |
| 250,0-499,9 | | | Wilmington | | 2 | 10-24,999 | No. | DDS | 500-999,999 | No. DDS |
| 500,0-999,9 | | | Braidwood | | 0 | | | | Over 1 Million | No. DDS |
| Over 1 M | | | Crete | | 0 | | | | Unknown | No. DDS |
| Unk. | | | | | | | | | | |

*Fig. 1.—Réproduction of a page from the directory and a county data card*

Table 1.—Number of communities in Illinois with and without dentists in 1947, and total population by size of community, 1940

| Size of community | Total number of communities | Total population, 1940* | Number of communities | |
|---|---|---|---|---|
| | | | with dentists | without dentists |
| Total | 1,142 | 7,897,000 | 457 | 685† |
| Less than 1,000 | 714 | 325,000 | 111 | 603 |
| 1,000-2,499 | 218 | 338,000 | 147 | 71 |
| 2,500-4,999 | 89 | 309,000 | 79 | 10 |
| 5,000-9,999 | 62 | 443,000 | 61 | 1 |
| 10,000-24,999 | 36 | 551,000 | 36 | — |
| 25,000-49,999 | 14 | 514,000 | 14 | — |
| 50,000-99,999 | 7 | 491,000 | 7 | — |
| 100,000 or more | 2 | — | 2 | — |
| Peoria | — | 105,000 | — | — |
| Chicago | — | 3,397,000 | — | — |
| Unincorporated areas | — | 1,424,000 | — | — |

*In round numbers. *Sales Management* 58:144 (May 10) 1947, estimates Illinois' population to have increased by 129,000 since 1940. Detailed information is not available concerning the distribution of this increase among individual communities.

†The 685 communities without dentists had a total resident population of 412,000.

This procedure provides a basic working file which might be put to valuable use in this form or might serve as a basis for further development. As one instance, the Committee on Dental Economics, American Dental Association, presents the following analysis of the distribution of dentists in Illinois. The steps followed will be readily apparent from the presentation.

## Dental Service in Illinois

It is commonly known that dentists practice in communities of all sizes. Authoritative information is not available, however, about the relative dispersion of dentists among communities of various sizes, or about their distribution over large areas such as states. Table 1 presents summary data on the distribution of the state population by community size and about the postwar status of dental resources in these communities. With only one exception, all communities with populations of more than 5,000 have resident dentists. This one exception, incidentally, has a population of slightly more than 5,000 and is located within a very short distance of a large city. A majority of communities with populations of 1,000 to 2,500 have dentists, while a smaller proportion of communities with populations below 1,000 have dentists—actually, 111 out of 714 incorporated places.

Table 2 presents summary data on the distribution of dentists by community size. Except for communities below 2,500 in size, the ratio of dentists to total residents in towns and cities in each size class stands rather consistently at the same level. The dentist-population ratio ranges from a high of almost 10.5 dentists for each 10,000 population in one community with slightly over 100,000 population, to a low of 8.4 dentists per 10,000 persons in 61 communities with populations ranging between 5,000 and 10,000. Communities with populations of 1,000 to 2,500 average about 12 dentists per 10,000 residents, while communities with populations below 1,000 average about 23 dentists per 10,000.

A hasty interpretation of the last two

**Table 2.—Distribution of dentists and ratio of dentists to population by community size in Illinois, 1947**

| Size of community | Number of dentists | Dentists per 10,000 population |
|---|---|---|
| Total | 6,116 | 7.74 |
| Less than 1,000 | 126 | 22.91* |
| 1,000-2,499 | 271 | 11.89* |
| 2,500-4,999 | 243 | 8.77* |
| 5,000-9,999 | 372 | 8.40 |
| 10,000-24,999 | 473 | 8.58 |
| 25,000-49,999 | 465 | 9.05 |
| 50,000-99,999 | 511 | 10.41 |
| 100,000 or more | — | — |
| Peoria | 95 | 9.05 |
| Chicago | 3,560 | 10.48 |

*Computed from estimated total population in communities with dentists. Ratios would be appreciably lower for three smallest community sizes if the total population of communities with and without resident dentists were considered.

figures might result in some extremely misleading conclusions. Seemingly the two smallest community sizes support more than the average number of dentists, if we consider only the number of residents in communities with dentists. This is obviously fallacious, since a great number of additional communities of the same size do not have dentists. Additional verification is available in studies of dentists' income by community size,[6] which indicate that the average income of dentists in the smallest towns generally has been lower than in communities of greater size.

This type of analysis also does not give consideration to the people of the state who do not reside within incorporated areas. An estimated 1,836,000 persons, or about 23 per cent of the total state population, live in rural areas or in communities without dentists. This group obviously would have to visit a nearby community in order to obtain dental service.

6. Bagdonas, J. E., Economic Considerations in Re-establishing a Dental Practice. *J.A.D.A.* 33:4 (January 1) 1946.

It can be assumed for the moment that the residents of communities with dentists may obtain necessary dental service in their home towns, thus covering about 77 per cent of the state's population. Then how readily available are the services of a dentist for the remainder of the population? Much research has been done on the marketing habits of rural populations. Many studies have been made concerning their shopping habits, the distances they will travel in order to examine or purchase from adequate selections of various categories of goods and the factors involved in choosing one trade center over another. On the basis of such studies, market research analysts are able to predict with surprising accuracy the relative need for given types and sizes of stores or service establishments in given communities. These analysts also have delineated "trade areas" around principal centers, and they can predict with reasonable certainty the proportion of the rural population of an area which will travel to given centers to obtain principal goods and services.[7]

## Dental Service Areas

Unfortunately, such studies rarely have delved into the habits of rural families in connection with the purchase of dental or medical care. The study by Converse[7] describes the buying habits of families residing in outlying communities of one major retail trade area in Illinois. Although it dealt principally with the purchase of tangible

7. Converse, P. D., *A Study of Retail Trade Areas in East Central Illinois*. Bureau of Economic and Business Research, University of Illinois, Urbana, 1943, p. 7. The purpose of retail trade area analysis is summarized by this authority as follows: "Analyses of retail trade areas are useful in helping retailers to select locations for stores, to determine their probable trading territories, to measure the purchasing power of those territories, to ascertain whether they are drawing trade from all parts of their territories, and to decide whether they are covering their territories with adequate advertising. They should know why they are attracting trade from other trading areas or why they themselves are losing trade to competing towns. . . . Furthermore, the general reputation of the town, its amusements, and its various professional and personal services have their effect upon trade movements."

goods of various types, some attention was paid to the purchase of medical and dental care.

Table 3 presents summary data on distances which families traveled in order to obtain dental service. The study covered eight communities with populations ranging from 400 to 1,800. Four communities had resident dentists, while four had no resident dentists. No effort was made to apply refined statistical technics to the limited data; the percentage figures and average distances traveled were computed without weighting for differences in population in each community. Over 50 per cent of families in towns with one or more resident dentists obtained dental service in their home town. Considering all families together, the average distance traveled to obtain dental service was almost 10 miles; residents in towns without dentists traveled 17 miles. In fact, more than two thirds of the families indicated they obtained dental service within a 20 mile radius of their home towns. It becomes apparent at this point that dental service areas exist which are similar to retail trade areas. This may be considered as a new concept to be used in approaching the problem of availability of dental care in a large geographic area. In order to test this concept over an entire state, the data on the county cards previously described were used to draw service areas around the communities in Illinois which had resident dentists.

It was assumed that 20 miles would be a reasonable distance for the rural population to travel to a center in order to obtain dental service. This may be accepted as a conservative assumption for a middle western plains state such as Illinois. This distance would represent less than an hour's travel over an adequate road system, either by automobile or interurban transportation. It must be emphasized that this assumption is tentative and that it does not extend necessarily to all or many other states.

**Table 3.—Percentage of families in eight small communities traveling given distances for dental service in Illinois**

| Distance (miles) | Percentage | | |
|---|---|---|---|
| | Total | Resident dentist | No resident dentist |
| Total | 100 | 100 | 100 |
| Home town | 35.3 | 56.6 | 0.0 |
| Under 10 | 8.6 | 0.0 | 33.1 |
| 10-19 | 23.9 | 22.9 | 23.0 |
| 20-29 | 6.7 | 0.0 | 13.0 |
| 30-39 | 2.7 | 3.2 | 8.6 |
| 40-45 | 2.0 | 3.2 | 5.8 |
| Unknown | 20.8 | 14.1 | 16.5 |

Average distance traveled, all cases except those in "unknown" category: 9.5 miles. Average distance traveled, all cases except those using home town dentist and "unknown" category: 17.0 miles. Compiled from data presented in *A Study of Retail Trade Areas in East Central Illinois*.[7]

It is possible that the use of a simple radius of any given distance would not fit the circumstances in even the majority of cases. Consideration must be given to the presence or absence of roads or other transportation arteries; to the presence or absence of natural barriers such as rivers, mountains and similar topographic obstacles. In the case of Illinois, however, these natural barriers rarely exist, and roads are adequate; therefore this simplified approach may be used with little hesitation.

In a graphic presentation of the coverage of the state from communities which have dentists, the principal communities of given population sizes were indicated by special markings. Shaded areas with a 20 mile radius were drawn around each community with 5,000 or more population. It became apparent that extensive overlapping exists over a large part of the state, indicating that rural families have a choice of several different localities at which to obtain dental service. More than 90 per cent of the total population of the state was covered within the shaded areas on the map. As a final step, communities be-

low 5,000 in size which have dentists were checked on the map without attempting to delineate their service areas. In all instances where interstitial spaces existed between the principal service areas, it was found that these smaller communities provided adequate coverage.

One county in Illinois (Henderson, along the western border) does not have any resident dentists. The service area concept proved to be a valuable approach in interpreting or analyzing this situation. Its county seat has a population of slightly more than 900 and apparently is the largest community in the county. The city of Burlington, Iowa, with a population of 26,000, lies directly across the Mississippi River and within 20 miles of most residents of this county. Other large Illinois communities have service areas covering portions of the same county.

However, the technic of establishing service areas does not provide a full picture of the actual status of dental care in any given area. An important complementary aspect which must be considered is the supply of dentists in relation to the number of residents of an area who must depend on the local dentist or dentists for service. This approach places the entire issue of availability of medical or dental care in its most critical perspective. Earlier studies generally have attempted to present this issue in terms of population-dentist ratios for individual geographic-political units, such as communities and counties. The earlier discussion in this paper provides ample evidence that such an approach often is unrealistic and unsound. Service areas do not stop at county boundaries or city limits. Seemingly a broader base than the county is required to present an adequate analysis.

An economic study of Illinois indicates that there are about thirty counties which serve as principal trade centers for the entire state.[8] A detailed examination of the data reveals that these counties generally have communities of 10,000 or more population. Because of the extreme overlapping of the fifty-nine service areas centered on communities of 10,000 or more population, many difficulties arise in allocating populations to various centers. Important and significant work can be done to delineate and refine dental service areas on this basis. For purposes of this exploratory study, however, a less precise delineation was made. Figure 2 presents one effort to delimit broad areas of the state. Counties have been grouped as logically as possible around one or more major centers, taking into consideration the distance from the center of each county to competing trade centers. The total population of the grouped counties in each area and the total number of dentists residing in the area have been used to compute the ratio of dentists for each 10,000 residents. The ratio in the metropolitan Chicago area stands at slightly more than 9 dentists for each 10,000 residents. In contrast, areas 8 and 9 in the southern end of the state have slightly more than 3.5 dentists for each 10,000 residents. The remaining six areas into which sixty-seven counties were grouped rather consistently averaged between 4.4 and 5.8 dentists for each 10,000 residents. Statistical testing of the means reveals significant differences not accounted for by chance between these broad groupings. Table 4 presents the detailed findings of this analysis.

Even when the metropolitan Chicago area is extended to include seven surrounding counties which lie roughly within a 20 mile radius of its borders, the ratio still is almost double that for the remainder of the state. Further, the metropolitan ratio is almost triple the

8. Converse, P. D., *County Incomes and Trade Movement in Illinois*. Bureau of Economic and Business Research, University of Illinois, Urbana, 1945, p. 12.

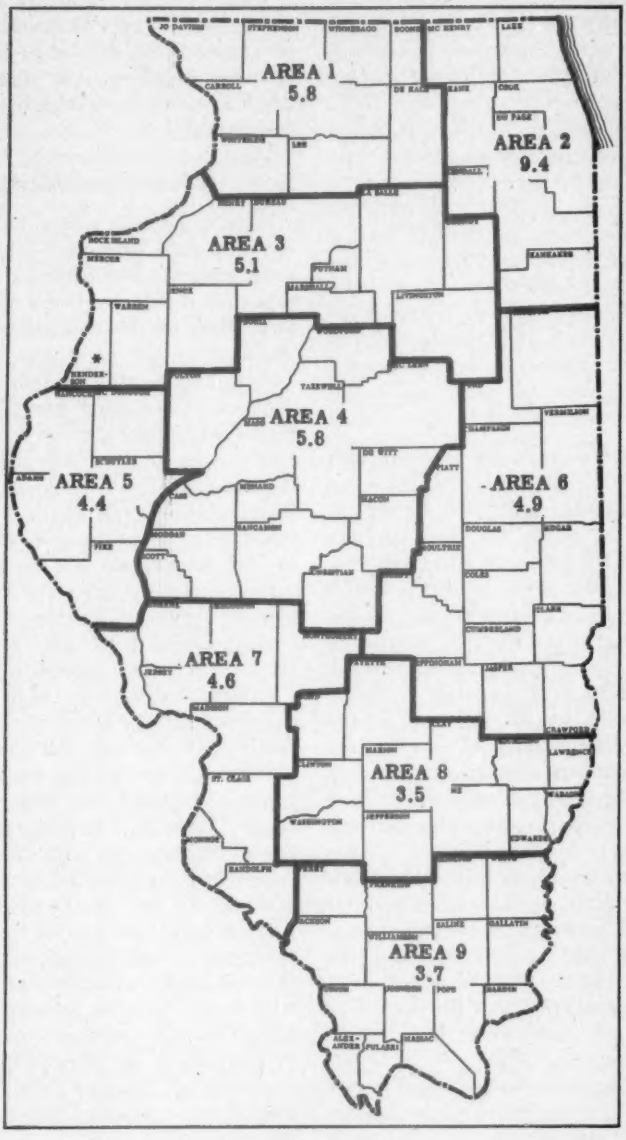



*Fig. 2.—Ratio of dentists to population by major areas in Illinois, 1947. The figure in each area represents the number of dentists per 10,000 population. Henderson county, marked with an asterisk, is the only county in Illinois without a dentist. The estimated population of the state in 1947 was 8,025,300, of whom 6,116 were dentists, or 7.62 per 10,000 population. Of the 4,225,700 population in Cook County, 4,147 were dentists, or 9.81 per 10,000 residents. The rest of the state's population numbered 3,799,600, with 1,969 dentists, or 5.18 per 10,000 inhabitants*

Table 4.—Distribution of population and dentists by major areas in Illinois, 1947

| Area | Number of counties | Population 1947 (rounded) | Number of dentists | Dentists per 10,000 pop. |
|---|---|---|---|---|
| Total | 102 | 8,025,000 | 6,116 | 7.62 |
| 1 | 9 | 366,600 | 214 | 5.83 |
| 2 | 8 | 4,855,400 | 4,548 | 9.36 |
| 3 | 13 | 477,000 | 244 | 5.11 |
| 4 | 15 | 713,400 | 412 | 5.77 |
| 5 | 6 | 151,600 | 67 | 4.41 |
| 6 | 15 | 396,800 | 196 | 4.93 |
| 7 | 9 | 515,900 | 237 | 4.59 |
| 8 | 12 | 238,800 | 84 | 3.51 |
| 9 | 15 | 309,800 | 114 | 3.67 |

ratio for two areas in the southern part of the state which include twenty-seven counties and almost 550,000 persons. In more precise terms, the metropolitan area has 4,855,000 persons, 4,548 dentists, and a ratio of 9.4 dentists to 10,000 persons, as against 548,000 persons, 198 dentists, and a ratio of 3.6 dentists to 10,000 persons. Although consideration must be given to the possible availability of dental service in communities across the boundaries of surrounding states, it appears in this instance that extension of service areas would have a negligible effect on the ratios of these major areas.

In order properly to evaluate or interpret these facts, further investigations are needed, in which more refined technics can be used to explore influencing factors such as the long term economic status of these areas and the appeal or attraction of these areas for dentists seeking locations.

Certainly dentists can be urged to give serious consideration to facts such as these when considering the selection of locations in Illinois as well as in other states. In addition, planning for dental health programs will require close scrutiny of problems like these before efforts may be made to establish sound programs. The presence or absence of an adequate supply of dental personnel in a major area will be of first importance in deciding what steps must be taken initially in developing plans for dental care.

## Application of Data

Some difficulties still exist in accepting these data without consideration of some general circumstances in connection with the development of the directory. Plans for the dental directory were initiated in the prewar period, when questionnaires were sent to all known dentists. Since then every effort has been made to add data on recent graduates and to collect information on the current status of dentists, changes in location and losses by death. During the last two years, the directory department of the Association has rechecked the status of dentists since the close of the war, by verifying locations against current membership records, telephone directories and state registration lists.

Information as to status in practice is not available for some of the dentists listed in the directory. An unascertained number still are listed as being in active practice although they now may be retired. Others may be maintaining their dental registrations with state authorities even though they are not engaged in activities in the dental field. Further, some dentists are serving in full time positions as dental administrators, dental school teachers, or as salaried dentists with health agencies, schools and industries. Obviously these groups should not be counted in an attempt to arrive at estimates of the net total manpower available to provide dental service to the general public.

It is almost impossible at present to provide a simple means by which such individuals may be subtracted from the community totals. For purposes of general analysis such as this study, it may

be assumed that the data overstate the number of dentists in active practice on a statewide basis as well as for given localities. Since the same overstatement would apply over the entire state of Illinois as well as over other states, it might be accepted as a presumably consistent error of unmeasured dimensions which would tend to reflect a more adequate supply of dentists everywhere than actually is the case.

### Other Uses of Summary Cards

The dental directory provides several other useful items of information concerning dentists and their status in practice. Numerical entries next to each name indicate whether the dentist is a current member or nonmember of the Association; another entry indicates whether the dentist is in general practice, retired or engaged in given specialties; another indicates the year of graduation from dental school, which may be taken as an approximate index to his age. Each of these items may be used in making more detailed analyses of local and state personnel resources in connection with location activities and with dental health program planning. Facts concerning the names, number and distribution of nonmember dentists can be used administratively to intensify efforts to enroll qualified dentists as members of the professional organization.

As pointed out earlier, the list of communities with dentists can be checked against standard sources such as the census reports to ascertain which communities do not have practicing dentists. Such information may prove to be extremely valuable to recent dental school graduates and to dentists considering relocation. This list may be presented graphically in connection with information on existing service areas.

Unfortunately, the recent serious budgetary retrenchment program of the American Dental Association forced a limitation of the scope of this study. This report, therefore, represents an incomplete effort to evaluate the uses of the directory. Further developments are pending which may make possible a more detailed study of available data under other auspices.—*535 North Dearborn Street.*

***A.M.A. View on Sulfonamides.***—The Council believes it necessary to emphasize again the potential hazards of the indiscriminate topical use of sulfonamide preparations. Inquiries are being received concerning the local use of sulfonamides in conditions for which there is no evidence of their values, such as hair tonics to control dandruff and promote growth of new hair, in shave creams to prevent infection, and in other equally inconsequential preparations. Not only are the sulfonamides ineffective in such preparations, but their use in any concentration represents a real danger to the user for three reasons: (1) the substitution of an ineffective remedy for one which might be of value, (2) the possibility, now widely recognized, of permitting the development of sulfonamide resistant organisms and (3) the development of cutaneous sensitization, thus preventing the use of sulfonamides in serious conditions for which these drugs are known to be effective.—*"Sulfonamides for Local Application Deleted from N. N. R." Report of the Council, J.A.M.A. 135:157, September 20, 1947.*

# A PLAN FOR FURTHERING MEDICAL-DENTAL RELATIONSHIPS

Report by the Joint Committee From the Rhode Island Medical Society and the Rhode Island State Dental Society

At a joint meeting of the Providence Medical Association and the Rhode Island State Dental Society, it was proposed that a committee of physicians and dentists be appointed to study existing medical-dental relations and to present recommendations as to how a state-wide relationship, acceptable to both professions, might function and grow in character and usefulness. This proposal was accepted by the council of the Rhode Island Medical Society and the trustees of the Rhode Island State Dental Society.

## General Trends

Recently the American Medical Association and the American Dental Association appointed a joint committee to promote interrelations of the two professions in education and practice. The Council on Education and Hospitals of the American Medical Association advocated the inclusion of dental departments in hospitals throughout the country, a measure which is supported and emphasized by the Commonwealth Fund in its report on hospital care.[1] The Council on Education of the American Dental Association also supported the measure by setting up standards for hospital dental internships and residencies. Among other suggestions the Commonwealth Fund stated in its report: "Dental examinations, directed toward the discovery and diagnosis of dental and oral infections which may be related to systemic diseases, should be made of all patients admitted to hospitals except when the physician in charge pronounces this procedure unnecessary or impractical."

These general trends indicate emphatically the need for further growth and wider application of the biologic phases of dentistry's procedures. All of this is significant, for it plainly points out why health service to the "whole man" requires the formulation of a program wherein the forces and influences of the medical and dental professions shall be coordinated intimately to solve problems of mutual interest and concern.

## Immediate Objective

The immediate objective of our study was to formulate a plan by means of which the ideals, theories and practices of the two professions might be coordinated so well that it would include all desirable policies.

In order to decide on the most desirable medical-dental relationship and how its component parts may be correlated to function effectively, it is necessary to appraise the structural ele-

---

Committee report in the form of a commentary with specific and implied recommendations to the Rhode Island Medical Society and the Rhode Island State Dental Society. The entire report was accepted in principle by both societies.

Members of the Committee are: Charles L. Farrell, M.D., chairman; Albert L. Midgley, D.M.D., Sc.D., secretary; Harold Calder, M.D., Frank Canning, D.M.D.; Charles Cannon, D.M.D.; James F. Colgan, D.M.D.; Nicholas Migliaccio, D.M.D., and Edward T. Streker, M.D.

1. Commission on Hospital Care, *Hospital Care in the United States*. New York: Commonwealth Fund, 1947.

ments of each profession—their bases of education, teaching, literature, research, practice, legislation and civic relations, and such related activating agencies as universities, medical and dental schools, hospitals, medical and dental societies, medical and dental licensing boards and civic organiations. The present medical-dental relationship is the result of the failure of the two professions to recognize the value and significance of a more desirable and potent combination of these basic and activating agencies.

### Close Relations Are Essential

Available data indicate that intimate cooperation between the two professions is essential for the promotion of the public welfare. Dental students and some dentists should have a better medical understanding, and medical students and some physicians should have a better dental understanding. Close relations between dental and medical schools, and between dentists and physicians, for teaching, research and service are fundamental. Therefore it follows that favorable conditions for close collaboration between medical and dental practitioners are much to be desired.

### Cooperative Service

*Relationship* is only an idea until it is put in practice. Medicine and dentistry already have similar motives and similar aspirations. They need only a comprehensive program of cooperative service to coordinate the two professions intimately in spirit and in deed. Their patients' needs will bring them together and inspire them with mutual confidence and respect, which will result automatically in consultations, investigation and research. The more scholarly members of each profession will read the literature of the other profession. In areas remote from professional schools the medical and dental societies may combine to sponsor courses arranged by colleges and affiliated hospitals.

Dentists and physicians everywhere should become aware that many of their problems are interrelated. They should become more proficient in applying the medical sciences to their interrelated problems, become so familiar with diagnosis that they can recognize the significance, local and systemic, of dental and oral pathology, and become so zealous to maintain health that they welcome the privilege of cooperative service. Thus they would enhance the value of their special knowledge and skills in the maintenance of health, the prevention of disease and the cure of illness.

### Broader Knowledge

All dentists should possess sufficient knowledge of medicine and clinical medicine to observe and appraise their patients' abnormal conditions and to be able to speak competently when advising consultations with physicians. Such knowledge of clinical medicine by dentists would result in closer and more intelligent cooperation with physicians. Dental and medical practitioners thus would render health service on a broader basis. Such knowledge would enable dentists to read medical literature profitably, to participate in public health work effectively, and to cooperate actively in consultations with physicians.

If a dentist has adequate knowledge of the values of clinical medicine he often is able to detect early symptoms of ill health outside the range of oral treatment in his patients and to refer them to their physicians for timely medical attention. Physicians and their patients would benefit similarly if all doctors were instructed in the principles of clinical dentistry.

Physicians should know the simple and basic facts of dental structure and development. They should note dental defects and diseases and consult with dentists about the advice which should be given for the prevention and treatment of dental diseases and defects. Courses of instruction under university control for medical and dental practitioners should imitate the pattern of undergraduate professional education.

The biologic sciences are a common foundation for both medical and dental education. The two types of professional education should be coordinated effectively in universities, if each division is to meet fully its obligations in the training of professional personnel; both medicine and dentistry should be included in close coordination in all health service centers. Once the role of the teeth and oral tissues in the maintenance or impairment of health is recognized, the general neglect in medical education of these parts of the body will cease. When medical undergraduates and physicians receive adequate instruction in these subjects, the public will have more efficient health service.

Practical instruction and experience for medical and dental practitioners are linked with the schools and their hospitals in the areas with medical and dental schools. In states without professional schools further instruction and training for physicians and dentists should be available in courses operated under the auspices of the universities or colleges of arts in these areas, through their extension departments and their affiliated hospitals, and with the help of professional societies.

Adequate didactic and clinical instruction in medicine, surgery and associated specialties such as cardiology, dermatology, urology, hemology, pediatrics and nutrition may be given to dentists in states with neither medical nor dental schools by visiting members of faculties of nearby medical and dental schools, by physicians, dentists, research workers and other qualified persons. This was done a few years ago when the faculties of Harvard and Tufts dental schools conducted courses sponsored by the state dental society under the auspices of Brown University's biology department.

Certain phases of didactic and clinical instruction may be given by means of round-table discussions, demonstrations, conferences and so forth, under the sponsorship of professional societies, in state medical society libraries and other suitable places.

### Broader Scope

Opportunities for broadening the scope and usefulness of the medical-dental relation occur chiefly in hospitals and in the daily coordinated practices of physicians and dentists. These two sources—hospital service and private practice—should promote the public welfare and elevate the two professions in public respect and appreciation. The ensuing results will give a richer meaning and a deeper significance to the phrase "medical-dental relationships."

### Clinics

A hospital with a well organized medical-dental clinic and staff is essential to any program which requires an atmosphere of scientific and professional learning. A good medical clinic should be established in every general hospital to examine the patients referred to it from the operative dental clinic and other clinics in the hospital; to afford direct and frequent contact of dentists with clinical medicine and joint discussions by physicians and dentists of diseases and problems of mutual interest and concern, and to improve medical and dental practices by means of referral cases and consultations.

Close geographic and intellectual relations of dental and medical schools

and societies with hospitals and their various clinics are essential. This is especially true in the case of health service for children.

### Dental Departments

In some hospitals the dental departments tend to become outmoded and their programs are restricted, organized and operated under old-fashioned methods of education and practice. With the dynamic potential that the present day has brought to dental education through extended teaching of the basic sciences and application of their principles, most hospitals should improve, expand and reorganize their dental departments to equal their medical departments in teaching, research and service.

Some of the problems of reorganization are to ascertain what the activities of the dental department should be and how they may be coordinated effectively with medical and surgical services and with the special fields of practice, research and utilization of laboratories. These problems must be solved by the combined wisdom of hospital administrators, their medical and dental staffs and state medical and dental societies.

### Research

*Research* means repeated systematic efforts to extend the boundaries of knowledge at a particular point of inquiry. Occasionally research may be conducted by ordinary means, but in most instances it requires application of complicated and exacting methods. In medicine and dentistry application of the basic sciences to clinical problems has been the most fruitful research procedure. More cooperation between physicians and dentists would result in increased clarification of problems of mutual concern and undoubtedly would stimulate research for the solution of such problems. Oral and published discussion by practitioners would guide competent workers in research to desirable endeavors. Such research could be given special attention in hospitals.

### Joint Responsibility

Obviously medical and dental societies should operate in close relationship with the hospitals and cooperate to the mutual advantage of all. Such affiliations are of vital importance in an efficient health service program, which cannot be operated successfully without cooperative support by both professions. It is the responsibility of the medical and dental societies to set up educational programs by means of which dentists may collaborate with physicians in such fields as pediatrics, dermatology, nutrition, cardiology and internal medicine—to name only a few—in order to acquire the practical knowledge and understanding that would enable them to look after their patients' welfare more effectively.

As a preliminary to accepting this joint responsibility the two professions should consider the scope and content of an adequate education and training for medical and dental practitioners, where and by whom it should be given and what form it should take. There may be seminars, round-table discussions, conferences, prepared essays, programs for study and discussion at separate or joint meetings of the medical and dental societies. Such studies and discussions naturally would stimulate the preparation of articles and editorials of common interest and would raise the question of the dental society's relation to state medical society journals.

As for a professional literature, the means at hand are not inadequate. Essays and editorials of common in-

terest and concern, reports which feature histories of interesting cases and thought-provoking essays may well be published in medical and dental journals with the cost equitably shared by the medical and dental societies. The use of medical and dental books, as well as of buildings where professional activities may be promoted, should be granted cordially by the universities and colleges, hospitals and state medical libraries. For the general public, medical and dental health programs should be offered regularly in schools, welfare organizations and community centers and advertised in newspapers, magazines and radio talks. Health programs, sponsored by competent and up-to-date physicians and dentists, will command a considerable amount of public interest.

When the basic science examinations are conducted by a separate agency, as is being done now in certain states, the practical advantage of joint conferences of medical and dental licensing boards may be perceived. Clearly the united influence of the two professions should be a potent factor in supporting state bureaus of education to bring about the exclusion of hybrid types of medical and dental education. The professions also should assist the medical and dental licensing boards in preventing violations of medical and dental statutes.

This plan of cooperation should begin its effective functioning in the immediate future. The committee feels that acceptance of this report and its recommendations, set forth in expository form, could bring about more referrals, more consultations, better understanding and closer contacts, both professional and social. Also, it should develop wider knowledge and better application of the biologic phases of medicine's and dentistry's interrelated procedures, assure intimate understanding of the dignity and importance of each field of practice, and thus preserve the autonomy of medicine and of dentistry through a philosophy of coordination without subordination. Plainly a better integration and use of the basic sciences in clinical medicine and dentistry are destined to illumine the way toward the discovery of biologic secrets as yet undisclosed.

The committee takes this opportunity to thank the following persons for the suggestions derived from their writings on the subject, since they were of help in drawing conclusions: Edgar V. Allen, M.D., associate professor of medicine, Mayo Foundation, Graduate School, University of Minnesota, Rochester, Minn.; Virgil D. Cheyne, D.D.S., Ph.D., professor of pathology, The State University of Iowa, College of Dentistry, Iowa City; William J. Gies, M.S., Ph.D., professor emeritus of biochemistry, Columbia University Medical School, New York; John A. Kolmer, M.D., professor of medicine, Temple University, Schools of Medicine and Dentistry, Philadelphia; John Oppie McCall, A.B., D.D.S., former director of the Murry and Leonie Guggenheim Dental Clinic, New York; Frederick C. Waite, Ph.D., professor emeritus of histology and embryology, schools of Medicine and Dentistry, Western Reserve University, Cleveland.

***Ideals of a Great Physician.*** —I have three personal ideals. One, to do the day's work well and not to bother about tomorrow. The second ideal has been to act the Golden Rule, as far as in me lay, toward my professional brethren and toward the patients committed to my care. And the third has been to cultivate such a measure of equanimity as would enable me to bear success with humility, the affection of my friends with pride, and to be ready when the day of sorrow and grief came to meet it with the courage befitting a man.—*William Osler.*

THE Journal OF THE
AMERICAN DENTAL ASSOCIATION

JUNE 1948 • VOLUME 36 • NUMBER 5

LON W. MORREY, D.D.S., *Editor*

Published by the American Dental Association • 222 East Superior St. • Chicago 11, Ill.

## EDITORIALS

### HEALTH GOALS FOR THE NEXT DECADE: THE NATIONAL HEALTH ASSEMBLY

TEN year goals for the improved health of the American people were set forth by the National Health Assembly which was convened in Washington, May 1 to 4, by the Federal Security Administrator at the request of President Truman. Since final reports of the Assembly were not available at the time of going to press, no conclusive estimate as to the value of the Assembly in meeting its stated objective can be made. A news report of the Assembly will be found on page 507 of this issue.

The Assembly, which considered fourteen general problems in the field of health care, represented every shade of opinion from professional, technical and consumer organizations. It is likely that the final reports will reflect the compromises necessary to bring agreement between these groups. One section devoted itself to the discussion of dental health problems, and the summary of its report indicates that the precepts of the American Dental Association were given general acceptance.

If the reports of the various technical sections are made freely available to all who are interested in the health problem, there can be no question but that the Assembly has served a useful purpose. The discussions during the conference, on the whole, were on such a level as to permit free discussion and conclusion. The Assembly was a good example of democracy at work. The handling by government of the facts obtained and of the conclusions drawn can show further evidence of such democracy.

If the deliberations of the National Health Assembly, then, resulted in a clear look at basic health problems and in the designing of agreed health goals for the next decade, further conferences of this type will serve to advance the health of the American people.

## WORLD HEALTH ORGANIZATION: OPPORTUNITY FOR INTERNATIONAL COOPERATION

THE World Health Organization is the agency of the United Nations devoted to problems of international health. It is one of the few agencies which had an effective parallel in the structure of the League of Nations. Through the latter, the nations of the world made tremendous strides in such important problems as the regulation of narcotics, sanitation, quarantine and the control of epidemic diseases.

The World Health Organization should now take up the tasks relinquished by the earlier agency. The government of the United States should take the necessary steps formally to adhere to the conventions supporting it. In terms of the cost of war, the funds required to participate in the work of this agency are almost infinitesimal. Since disease does not recognize national boundaries nor diplomatic complexities, the people of this country are entitled to the protection which an active international health agency can afford.

The World Health Organization represents an almost unique opportunity for international cooperation. In a time when international discord seems to be the rule rather than the exception, such an opportunity should be seized and improved as rapidly as possible. The Congress of the United States will render the people a signal service by immediate authorization of participation in the World Health Organization.

## APPROVAL OF THE HARVARD SCHOOL OF DENTAL MEDICINE

THE Council on Dental Education has announced the full approval of the Harvard School of Dental Medicine. The report of the committee which made the survey is presented elsewhere in this issue of THE JOURNAL. It will be observed that the committee was careful to recommend that the school should not be recognized as offering a pattern for other dental schools to follow. The mere cost per student of the Harvard plan would be prohibitive for any other school in America, since no other school is as fortunate as Harvard in its endowment for dental education.

The method of instruction, mainly tutorial, obliges the school to accept only fifteen new students each year. The effort to carry on all of the clinical instruction, both scientific and practical, in the last two years of the course is unique and must prove its way through experience. Since Harvard is not undertaking to turn out dentists in numbers to meet current demand, it is hoped that her splendid resources, her fine facilities and her accomplished faculty, with extensive provision for coupling teaching and research, will result in graduates who may be expected to engage in dental teaching and research.

It is gratifying to be assured that the Council's requirements are flexible enough to permit recognition of this notable experiment in dental education.

## THE NATIONAL HEALTH SERVICE ACT OF GREAT BRITAIN

THE nationalization of British health services goes into effect July 5. After that date, the government proposes to furnish everyone in Great Britain, regardless of means, with free medical and hospital service, certain forms of dental service and various supplementary services such as midwifery, home nursing and preventive medicine. Of course, the services are not free, as every taxpayer in England contributes to the national insurance fund.

Since 1946, when the National Health Service Bill was enacted, representatives of dentistry and medicine have endeavored to aid the Minister of Health to perfect the program so that it could function in the best interests of both the public and the professions. To date these efforts have failed. In fact, the plan contains so many provisions that are unacceptable to the physicians, that the British Medical Association has refused, by a vote of 40,814 to 4,735, to approve the program in its present form.

The British Dental Association, through its representative board, has recommended that members of the Association refuse to enter the national service until the act and its regulations are amended so as to include the principles advocated by the Association. Dentistry under the National Health Insurance Act will be rendered on a basis different from that of the medical service. Priority dental care will be furnished expectant mothers and children in welfare stations and school clinics. General dental care will be furnished adults in dental centers and in private dental offices. Any dentist may participate, and the names of participating dentists will be published in each area. Dentists will be employed in the dental centers on a full or part time salaried basis. Dentists in private offices will furnish service on a fee basis. Normally, they will be permitted to start treatment of the patient immediately, and subsequently will submit a claim for payment from public funds. For certain forms of treatment, however, the dentist will be required to submit an estimate of proposed services to a Dental Estimates Board. Payment will be made to the dentist by the Executive Council, in accordance with a prescribed scale of fees or, in some cases, on special estimates determined by the Estimates Board.

Britain's dentists object to the provision that estimates must be submitted to a supervisory body. In a recent conference with the Minister of Health, Aneurin Bevan, representatives of the British Dental Association recommended that the profession be allowed a greater degree of freedom in carrying out treatment without prior approval by an estimates board. It was also recommended that it be a condition of the Health Service that patients accept all treatment necessary to secure dental fitness, and that dental service be financed by the government on a grants-in-aid basis. All three recommendations were refused by Mr. Bevan, on the ground that they would add too much to operating costs.

Thus it is apparent, even before the program goes into effect, that limited funds will restrict the quantity, and may impair the quality, of dental service furnished beneficiaries of the health insurance system. What effect these limita-

tions will have on the initiative of the dentists and the development of dentistry in England can easily be estimated.

Mr. Bevan's reasons for refusing to consider the recommendations of the British dental representatives substantiates the belief long held by dentists in the United States, that complete dental service cannot be provided through a system of compulsory health insurance financed by premiums that the average person can pay.

The proposed plan to provide priority dental service to all expectant mothers and children is logical and may be possible even with existing limited funds and personnel. Certainly it is in keeping with the modern concepts of dentistry. However, the program contains no provisions for research that may lead to the prevention and control of dental disease. Unless such provisions are made British dentists will continue indefinitely to fill, extract and replace teeth. Experience has proved that a successful dental program cannot be built on these services alone.

The future of the entire national health service program may well be viewed with misgivings, as it is little more than a decorative extension of a plan that has served England's low income group so ineffectively since 1911. The most serious defect of the entire program is that it has failed dismally in enlisting the sympathy and cooperation of the health professions. No program can succeed with such a handicap.

## PRINTING CONTROVERSY AFFECTS THE JOURNAL

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION continues to be affected by the inability of compositors and printers to settle their labor disputes. The long absence of compositors from the plant which prints THE JOURNAL forced the Association to combine the April and May issues and publish the combined issue in reduced form. Also, it has been necessary for the editorial department to substitute a slightly different type face for that customarily used in THE JOURNAL. It is hoped that the labor controversy soon will be settled, although as of May 1 the prospects did not look too encouraging. Unless the situation grows more acute, future issues of THE JOURNAL will be published on schedule.

REPORTS OF

# COUNCILS AND COMMITTEES

## COUNCIL ON DENTAL EDUCATION

### APPLICATIONS FOR ADMISSION TO DENTAL SCHOOLS IN 1947

THE unprecedented pressure for admission to dental schools in September and October, 1947 prompted the Council on Dental Education to seek definite information concerning the number and geographic distribution of the applicants. The schools were asked to report the names of all applicants who were admitted and of all other applicants who filed entrance credentials. They were asked not to report the names of persons who merely made a general inquiry or sought a catalog or application blanks. The following tables include data furnished by 39 of the 40 dental schools of the United States. The totals of the figures on admission and distribution of students will not coincide exactly with the final statistics to be included in the 1947 *Dental Students' Register* because some changes were made after the reports were received. It is believed, however, that the figures are substantially correct and represent a true picture of the situation.

It will be observed in Table 1 that 10,313 different persons sought admission to dental schools. These 10,313 persons filed 17,671 applications by submitting credentials in many cases to more than one school. From this number of 10,313 persons, the schools finally selected and admitted 2,942 freshmen. The final records will show about 3,000 freshmen. Every state furnished more applicants than could gain admission, but some residents from every state except Nevada were admitted. The publicly supported dental schools were obliged to confine their admissions largely to their own residents, and the classes in the privately endowed schools were promptly filled by applicants in their immediate environments.

Information is not available concerning the mental and manual aptitudes of the 7,371 applicants who did not gain admission. Since the requirements are well known, it is reasonable to assume that all of them had completed or were about to complete the requirement of two years of college work including the specified subjects. It is the judgment of several deans and directors of admission who have been consulted that perhaps half of this group would have been able to satisfy the announced scholastic requirements, quantitatively and qualitatively, and to meet all other conditions of admission.

This situation presents serious questions: How many dentists can be gainfully employed in serving the public now and ten and twenty years from now? How far should society go in providing opportunity for dental education for the qualified persons who seek it? How far should the different areas of the country go in providing opportunity for dental education for

**Table 1.—Applications to dental schools by states**

| State | Residents applying to dental schools | Total applications made by residents | Applications per individual | Number admitted in home state | Per cent admitted in home state | Number admitted outside home state | Per cent admitted outside home state | Total number admitted to dental schools | Total number not admitted | Per cent not admitted | Non-residents admitted | Total number admitted in state |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 171 | 312 | 1.8 | ..... | ..... | 28 | 16.4 | 28 | 143 | 83.6 | ..... | ..... |
| Arizona | 57 | 109 | 1.9 | ..... | ..... | 17 | 29.8 | 17 | 40 | 70.2 | ..... | ..... |
| Arkansas | 117 | 167 | 1.4 | ..... | ..... | 31 | 26.5 | 31 | 86 | 73.5 | ..... | ..... |
| California | 763 | 1,141 | 1.5 | 165 | 21.6 | 7 | 0.9 | 172 | 591 | 77.5 | 48 | 213 |
| Colorado | 102 | 197 | 1.9 | ..... | ..... | 15 | 14.7 | 15 | 87 | 85.3 | ..... | ..... |
| Connecticut | 173 | 471 | 2.7 | ..... | ..... | 37 | 21.4 | 37 | 136 | 78.6 | ..... | ..... |
| Delaware | 17 | 50 | 2.9 | ..... | ..... | 5 | 29.4 | 5 | 12 | 70.6 | ..... | ..... |
| District of Columbia | 71 | 102 | 1.4 | 21 | 29.6 | 5 | 7.0 | 26 | 45 | 63.4 | 123 | 144 |
| Florida | 214 | 398 | 1.9 | ..... | ..... | 40 | 18.7 | 40 | 174 | 81.3 | ..... | ..... |
| Georgia | 192 | 261 | 1.4 | 41 | 21.4 | 4 | 2.1 | 45 | 147 | 76.6 | 51 | 92 |
| Idaho | 43 | 99 | 2.3 | ..... | ..... | 13 | 30.2 | 13 | 30 | 69.8 | ..... | ..... |
| Illinois | 525 | 778 | 1.5 | 160 | 30.5 | 34 | 6.5 | 194 | 331 | 63.0 | 114 | 274 |
| Indiana | 242 | 342 | 1.4 | 82 | 33.9 | 21 | 8.7 | 103 | 139 | 57.4 | 8 | 90 |
| Iowa | 234 | 341 | 1.5 | 58 | 24.8 | 20 | 8.5 | 78 | 156 | 66.7 | 0 | 58 |
| Kansas | 148 | 178 | 1.2 | ..... | ..... | 42 | 28.4 | 42 | 106 | 71.6 | ..... | ..... |
| Kentucky | 197 | 244 | 1.2 | 52 | 26.4 | 6 | 3.0 | 58 | 139 | 70.6 | 11 | 63 |
| Louisiana | 141 | 176 | 1.2 | 40 | 28.4 | 6 | 4.3 | 46 | 95 | 67.4 | 10 | 50 |
| Maine | 43 | 76 | 1.8 | ..... | ..... | 19 | 44.2 | 19 | 24 | 55.8 | ..... | ..... |
| Maryland | 94 | 114 | 1.2 | 30 | 31.9 | 8 | 8.5 | 38 | 56 | 59.6 | 80 | 110 |
| Massachusetts | 222 | 657 | 3.0 | 45 | 20.3 | 30 | 13.5 | 75 | 147 | 66.2 | 58 | 103 |
| Michigan | 420 | 633 | 1.5 | 145 | 34.5 | 12 | 2.9 | 157 | 263 | 62.6 | 20 | 165 |
| Minnesota | 222 | 275 | 1.2 | 93 | 41.9 | 6 | 2.7 | 99 | 123 | 55.4 | 7 | 100 |
| Mississippi | 105 | 174 | 1.7 | ..... | ..... | 14 | 13.3 | 14 | 91 | 86.7 | ..... | ..... |
| Missouri | 137 | 304 | 2.2 | 68 | 49.6 | ..... | ..... | 68 | 69 | 50.4 | 157 | 225 |
| Montana | 32 | 104 | 3.3 | ..... | ..... | 13 | 40.6 | 13 | 19 | 59.4 | ..... | ..... |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nebraska | 111 | 134 | 1.2 | 47 | 42.3 | 1 | 0.9 | 48 | 63 | 56.8 | 31 | 78 |
| Nevada | 9 | 19 | 2.1 | ..... | ..... | ..... | ..... | ..... | 9 | 100.0 | ..... | ..... |
| New Hampshire | 61 | 98 | 1.6 | ..... | ..... | 17 | 27.9 | 17 | 44 | 72.1 | ..... | ..... |
| New Jersey | 304 | 741 | 2.3 | ..... | ..... | 80 | 24.7 | 80 | 244 | 75.3 | ..... | ..... |
| New Mexico | 19 | 34 | 1.8 | ..... | ..... | 2 | 10.5 | 2 | 17 | 89.5 | ..... | ..... |
| New York* | 1,267 | 3,114 | 2.5 | 175 | 13.8 | 79 | 6.2 | 254 | 1,013 | 80.0 | 24 | 199 |
| North Carolina | 208 | 374 | 1.8 | ..... | ..... | 40 | 19.2 | 40 | 168 | 80.8 | ..... | ..... |
| North Dakota | 35 | 76 | 2.2 | ..... | ..... | 8 | 22.9 | 8 | 27 | 77.1 | ..... | ..... |
| Ohio | 490 | 714 | 1.5 | 136 | 27.8 | 25 | 5.1 | 161 | 329 | 67.1 | 15 | 151 |
| Oklahoma | 171 | 230 | 1.3 | ..... | ..... | 34 | 19.9 | 34 | 137 | 80.1 | ..... | ..... |
| Oregon | 128 | 140 | 1.1 | 54 | 42.2 | 3 | 2.3 | 57 | 71 | 55.5 | 21 | 75 |
| Pennsylvania | 540 | 701 | 1.3 | 237 | 43.9 | 18 | 3.3 | 255 | 285 | 52.8 | 119 | 356 |
| Rhode Island | 103 | 218 | 2.1 | ..... | ..... | 31 | 30.1 | 31 | 72 | 69.9 | ..... | ..... |
| South Carolina | 93 | 135 | 1.5 | ..... | ..... | 17 | 18.3 | 17 | 76 | 81.7 | ..... | ..... |
| South Dakota | 46 | 94 | 2.0 | ..... | ..... | 12 | 26.1 | 12 | 34 | 73.9 | ..... | ..... |
| Tennessee | 165 | 215 | 1.3 | 38 | 23.0 | 7 | 4.2 | 45 | 120 | 72.7 | 29 | 67 |
| Texas | 561 | 788 | 1.4 | 95 | 16.9 | 16 | 2.9 | 111 | 450 | 80.2 | 27 | 122 |
| Utah | 136 | 303 | 2.2 | ..... | ..... | 46 | 33.8 | 46 | 90 | 66.2 | ..... | ..... |
| Vermont | 13 | 17 | 1.3 | ..... | ..... | 3 | 23.1 | 3 | 10 | 76.9 | ..... | ..... |
| Virginia | 151 | 203 | 1.3 | 37 | 24.5 | 16 | 10.6 | 53 | 98 | 64.9 | 11 | 48 |
| Washington | 196 | 314 | 1.6 | 40 | 20.4 | 10 | 5.1 | 50 | 146 | 74.5 | 8 | 48 |
| West Virginia | 159 | 263 | 1.7 | ..... | ..... | 33 | 20.8 | 33 | 126 | 79.2 | ..... | ..... |
| Wisconsin | 226 | 294 | 1.3 | 99 | 43.8 | 1 | 0.4 | 100 | 126 | 55.8 | 12 | 111 |
| Wyoming | 28 | 83 | 3.0 | ..... | ..... | 5 | 17.9 | 5 | 23 | 82.1 | ..... | ..... |
| Outside U. S. | 391 | 666 | 1.7 | ..... | ..... | 47 | 12.0 | 47 | 344 | 88.0 | ..... | ..... |
| Total | 10,313 | 17,671 | 1.7 | 1,958 | 19.0 | 984 | 9.5 | 2,942 | 7,371 | 71.5 | 984 | 2,942 |

*Columbia University not included

their residents? What areas appear to be in immediate need of additional opportunities for dental education? There are no ready-made answers to these questions. In the long run, they must be answered by the year by year demand for dental care.

Partial answer to the question of the need of additional schools may be had from the figures presented in Table 2 which presents the data in Table 1 according to the geographic divisions employed by the Census Bureau. It would appear that:

The New England states with two schools might maintain one additional school.

The Middle Atlantic states with six schools might maintain at least two additional schools.

Table 2.—Applications by geographic source of applicant

| Source of applicant | Applicants | Applications | Number admitted | Number not admitted | Per cent not admitted |
|---|---|---|---|---|---|
| NEW ENGLAND<br>Maine, Vermont, Massachusetts, New Hampshire, Rhode Island, Connecticut | 615 | 1,537 | 182 | 433 | 70.4 |
| MIDDLE ATLANTIC*<br>New York, New Jersey, Pennsylvania | 2,131 | 4,556 | 589 | 1,542 | 72.4 |
| EAST NORTH CENTRAL<br>Illinois, Indiana, Michigan, Ohio, Wisconsin | 1,903 | 2,761 | 715 | 1,188 | 62.4 |
| WEST NORTH CENTRAL<br>Iowa, Kansas, Minnesota, North Dakota, South Dakota, Nebraska, Missouri | 933 | 1,402 | 355 | 578 | 62.0 |
| SOUTH ATLANTIC<br>Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia | 1,199 | 1,900 | 297 | 902 | 75.2 |
| EAST SOUTH CENTRAL<br>Alabama, Kentucky, Mississippi, Tennessee | 638 | 945 | 145 | 493 | 77.3 |
| WEST SOUTH CENTRAL<br>Arkansas, Louisiana, Oklahoma, Texas | 990 | 1,361 | 222 | 768 | 77.6 |
| MOUNTAIN<br>Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming | 426 | 948 | 111 | 315 | 73.9 |
| PACIFIC<br>California, Oregon, Washington | 1,087 | 1,595 | 279 | 808 | 74.3 |
| ALL STATES | 9,922 | 17,005 | 2,895 | 7,027 | 70.8 |
| OUTSIDE UNITED STATES | 391 | 666 | 47 | 344 | 88.0 |
| TOTAL | 10,313 | 17,671 | 2,942 | 7,371 | 71.5 |

*Columbia University not included

The East North Central states with nine schools could readily fill one additional school but might meet the demands by expansion of present facilities.

The West North Central states with seven schools also might meet the demands by expansion of present facilities.

The South Atlantic states with five schools might maintain at least one additional school.

The East South Central states with three schools might maintain at least one additional school.

The West South Central states with three schools might maintain one additional school.

The Mountain states with no school might maintain at least one school.

The Pacific states with five schools could readily fill one additional school but might meet the demands by expansion of present facilities.

The expansion of opportunity for dental education as indicated would provide for perhaps 750 additional freshmen.

Consideration is now being given in several of these areas to the establishment of new schools. Although states and regional groups of states must in a measure provide opportunities for higher and professional education for their residents within their borders, freedom of exchange of students throughout the country is desirable. It is to be hoped, once all areas are provided with adequate opportunities for dental education, that schools will be enabled to promote the migration of students, even though the present marked tendency of most students to go back to their home region to engage in dental practice may continue to prevail.

## REPORT OF COMMITTEE ON SURVEY OF THE HARVARD SCHOOL OF DENTAL MEDICINE

Your committee upon invitation visited the Harvard School of Dental Medicine on Thursday and Friday, December 4 and 5, 1947. The findings of the committee are summarized as follows:

About six years ago the Harvard School of Dental Medicine, succeeding the Dental School of Harvard University, announced a five-year course designed to lead to both the medical and dental degrees. After two years given to exploration of the feasibility of the plan, in 1943 the combined course leading to the two degrees was abandoned. A four-year course leading to the degree of Doctor of Dental Medicine (D.M.D.) was then established. In the course now in operation the students spend their entire first and second years in the classes of the Harvard Medical School on exactly the same basis as medical students. They have full length courses in anatomy, physiology, biochemistry, bacteriology, pathology, pharmacology and physical diagnosis. Students enrolled in the dental course may not transfer to the medical course until after the dental degree has been obtained. The technical and clinical instruction are carried on in the third and fourth years of the course in the dental building and in associated hospitals.

This report was unanimously adopted by the Council on Dental Education at a meeting held on February 5 and 6, 1948.

The first class of seven members graduated on June 5, 1947. All have taken and passed their state board examinations in the states of their choice: Massachusetts, New York and Connecticut. Four of the seven graduates have entered the field of dentistry; two as practitioners (both with half-time teaching positions in local dental schools), one as a dental intern and one as a dental officer in the United States Navy. The remaining three have returned to the medical school as candidates for the medical degree and have avowed their intentions of remaining in the field of dentistry through maxillofacial surgery, research or teaching.

Appointments and facilities for administration and teaching are uniformly excellent. The administrative head of the school is designated as dean and is also associate dean of the Faculty of Medicine. The School of Dental Medicine has the same basis for representation as the Medical School at the meetings of the Committee of Professors and the Faculty of Medicine. The school has a separate budget and, subject to general university regulations, has freedom to select its own staff. Staff and facilities for teaching are adequate. A well appointed clinical library is maintained in the dental building. Accommodations and opportunities for research are unusually good. The students are carefully chosen upon the same requirements as those prescribed for admission to the Harvard Medical School. Occasional students are admitted upon two years of college work but three or four years are strongly recommended. Credit in biology; chemistry, inorganic and organic; physics; a modern language, and English is required. The aptitude test of the Association of American Medical Colleges and the Graduate Record Examinations of the Carnegie Foundation for the Advancement of Teaching are required. The school also participates in the aptitude testing program conducted by the Council on Dental Education.

The chief concern of your committee in its survey of the school was in the design and administration of the curriculum. This report deals, therefore, with an appraisal of the degree of success attained in accomplishment of the announced objectives of the school. Our purpose was to determine as accurately as possible the quality and effectiveness of the instruction and to compare the methods of instruction and the results obtained with similar conditions and achievements in the several dental schools of the United States. On the basis of these findings, our further purpose was to make recommendations to the Council looking toward the approval of the program of dental education at Harvard.

The broad purpose of dental education in the United States is to produce specially trained persons who have acquired a fund of scientific information relevant to the specialty of dentistry, who have developed intellectual skills characteristic of the scholar, who have formed sound ideals and unselfish attitudes of public service, and who have cultivated special performance skills to a degree of excellence that enables them to render competent services in an important area of health care.

In order to achieve this broad purpose Harvard places special emphasis on the selection of students of high scholarship who will be given in the first two years instruction in the several basic sciences, which is supplemented by instruction in some of the special medical sciences; and who will be given in the second two years suitable instruction in the basic dental sciences, in clinical practice and in hospital procedures. The purpose of selecting students of superior intellectual accomplishments and of requiring them to take the total first two years of the medical curriculum is based on the assumptions that with a high type student and the medical character of the

curriculum it will be possible to train capable teachers and research workers and to prepare practitioners better to serve the total health needs of the patient.

Leaders in dental education do not believe that the profession and the public can depend on such a formula to make good teachers, capable research workers and superior dentists. They believe that out of the total group of students of sound ability enrolled in the several dental schools of the United States there will come capable graduates who will make good teachers and research workers; and they do not believe that it is possible in two academic years for the dental student to acquire the special training and to gain the diversified experience which are regarded as essential to the training of competent dentists. Since capacity for action does not depend wholly upon intellectual acuity or even on special educational formulas, there is reason to believe that the dentistry of the future will be served well by natural leaders who will spring from the broad mass of dental students in the several dental schools in response to the challenge of opportunity.

The immediate purpose of dental education is to produce a sufficient number of competent specialists to minister to the effective oral health needs of society. While it is true that academic values must hold a high place in dental education, it is also true that its deliberate and immediate end is the good it may contribute to the comfort and health-safety of the public. It is on this theory of insuring competency in dental practice that state dental laws have been established and designed to protect standards of quality in dental education and to safeguard the health of the people. Any theoretical adjustment in the dental curriculum or any elevation of the requirements for admission to dental schools that tends to reduce materially the number of graduates and thus widen the gap between the supply of dentists and the demand for dental services would be a disservice to the public.

All professions have sought to advance the quality of their educational standards to higher levels and to do so as rapidly as practicable; yet, in the larger view, no profession has sought to make the selection of students so exclusive as to endanger an adequate supply of professional services. Dentistry is no exception to this general pattern, and it must take care not to embark on a futile course that would establish merely an aristocracy of learning while neglecting, in large measure, its immediate objectives. It must advance scholarship standards as the level of the education of the people rises and as the scientific requirements for the successful practice of dentistry become more extensive and more exacting. Overt advancement of standards of admission to dental schools and changes of requirements in the curriculum for the exclusive purpose of developing more and better teachers and research workers are perilous undertakings. Because the program at Harvard makes it necessary for enrollments to be reduced to very small numbers it is, to that extent, unacceptable from the point of view of the profession.

The dentist of the future must be prepared to engage in intelligent diagnosis, wise treatment-planning and skillful curative procedures. His basic learning and his clinical experience must be so broad and so thorough as to ensure both scientific and professional competencies. A knowledge of health values, on the one hand, and an ability to perform the many necessary operations in restorative and reparative dentistry, on the other, are equally essential objectives in dental education. A well-balanced program of instruction that places appropriate emphasis on both the science and the art of dentistry is the key to the training of a well-educated, highly skillful dentist.

To neglect the scientific foundations of dental practice would be unthinkable; to neglect the intimate details and recognized fundamentals of the art of dental practice would be disastrous.

It is admitted by those responsible that basic dental science instruction at Harvard School of Dental Medicine is abbreviated in order to give the students the advantages of the same preclinical curriculum as that arranged for the medical student. The first two years of the medical curriculum at Harvard include all the basic science courses common to the standard dental curriculum; in addition it includes courses in medicine, surgery, neuropathology, neurology and psychiatry, physical diagnosis and obstetrics. These various extra-dental courses which are essential to the professional growth of the medical student and designed for his benefit claim the places of the basic dental science courses that are included in the first two years of the conventional dental curriculum. While the medico-dental plan at Harvard *may* advance the dental student's knowledge of health values and relationships and *may* equip him to serve better the total health needs of the patient, at the same time it denies him that broad fundamental training in the basic dental sciences which is so essential to the development of a competent art of dental practice.

The conclusion must be that while more extensive experiences in the special medical sciences are desirable, they are not, at this point in the dental student's educational growth, fundamentally necessary to the development of a working knowledge of general health problems. Therefore, some of these medical subjects should come in the later years in the dental curriculum in order to avoid encroachment upon the places usually occupied in the earlier years of the curriculum by essential basic dental science courses.

The plan of instruction at Harvard in the basic dental sciences is unique among dental schools. At Harvard no time is devoted to this area of study until the student reaches his clinical years. Instruction in tooth morphology, in dental anatomy, in dental materials and in the several technical processes employed in restorative and reparative procedures in operative dentistry, prosthetic dentistry and crown and bridge, is not introduced until the beginning of the junior year and then only in a greatly abbreviated form. To a large extent, basic instruction in technical procedures employed in restorative dentistry is offered directly in the clinics without much previous instruction. Some orientation is provided by demonstrations, seminar discussions and a minimal amount of laboratory exercises. The limited emphasis on this phase of dental teaching is necessary at Harvard in order to allow the student to complete the dental phase of the course in two years. Disregard of early instruction in the basic dental sciences ignores the fact that preclinical exercises in dental technology are of greater importance in the education of the student than the mere development of manipulative dexterity. They serve also to develop effective habits of thinking and to relate the student's intellectual activities to his chosen way of life. Neglect of these fundamental requirements places the student under immediate handicaps and denies him an intimate view of a large sector of his professional outlook to which he is entitled.

The accepted approach to clinical instruction in dentistry is to offer a variety and quantity of preclinical exercises that will give the student a clear mental picture of the details and total scope of the many problems with which he must deal, that will develop in him habits of thinking which will lead to sound decisions in diagnosis and treatment, and that will cultivate his performance skills through essential repetition to the point

where he can progress in clinical practice with reasonable freedom from detailed supervision and with fair confidence in his powers to achieve satisfactory ends on his own responsibility. An adequate number of laboratory exercises is essential to preparation for amateur performance; while a wide variety and an adequate quantity of patient cases are necessary for the acquisition of speed and skill that are characteristic of genuine professional competency.

It is argued by those administering the Harvard program that deficiencies "which may result from a smaller number of rote repetitions of dental procedures is more than made up for by increased versatility in the handling of new situations." This is an easy assumption. Versatility in meeting new situations in dental practice is not acquired through a study of the basic sciences, though a knowledge of these constitutes the foundation of a rational, scientific art of practice. Versatility in new situations is acquired through the experiences gained by coping directly with a variety of related problems. There is no substitute for direct experience in the acquisition of either medical or dental competence.

In view of the total picture the conclusion must be that the extent of preclinical instruction in the basic dental sciences at Harvard is insufficient to serve as a sure foundation upon which effective, enlightened and spontaneous progress in clinical practice can be made.

The Harvard program proposes to make up for these deficiencies by providing adequate direct supervision of the student in all phases of his clinical practice through a high teacher-student ratio. The plan calls for the direct assignment of students to special instructors who exercise personal and constant supervision of all clinic cases treated by the student. Extreme care is taken by the teacher to present clearly to the student at the chair the theories underlying the various practical procedures and to give thorough instruction in technical procedures in the treatment of the various types of clinical cases. But under this method of instruction, sufficient time is not available in the two clinical years for the student to master the basic dental sciences and at the same time to develop performance skills to the same degree of competency as that achieved in other dental schools in the United States.

The Harvard program is planned on the theory that formal instruction in preclinical dental technology can be reduced almost to the vanishing point and be effectively compensated for by individual chair-side instruction. It assumes that instruction in the basic dental sciences is not a prerequisite to clinical practice, but that it may be offered in the several clinics as the need for it arises. In spite of these self-imposed difficulties the teaching staff has done a remarkably good job. The high average quality of the students and the competent and relatively large teaching staff go far towards overcoming the disadvantages of the plan. Yet it is obvious to the experienced observer that students working in the clinic are at a disadvantage because they lack a knowledge of essential tool subjects necessary in preparing them to make spontaneous responses to challenging situations.

Because of the high average scholarship of students enrolled at Harvard and the sound basic science training they receive in their preclinical years; because of the very high teacher-student ratio and the excellent instruction provided under the tutorial plan by a staff of highly competent teachers; and because of excellent clinic conditions which are devised to facilitate student progress and a schedule of instruction that is changed at short intervals to adjust the student's activities to rapidly changing conditions, Harvard is able to

carry forward its unique program with reasonable success. So long as these special conditions are sustained, the results of the program may, in the judgment of the committee, be regarded as acceptable. Any changes in these several details would militate seriously against the success of the program; any increase in student enrollment that would result in a reduction of the teacher-student ratio would be disastrous.

In view of the total picture the committee recommends that the Council on Dental Education give full approval to the program of dental education now in operation at the Harvard School of Dental Medicine. In giving its full approval the committee would urge the Council to make clear that *it does not recommend the program as a pattern to be followed by other schools* unless schools which may adopt it are able to meet the exacting requirements of small classes, a high teacher-student ratio, the almost prohibitive cost of instruction, and all the other special arrangements that contribute to making the Harvard program currently acceptable.

Respectfully submitted,

(signed) *J. Ben Robinson*
*James R. Blayney*
*Harlan H. Horner*
Committee

## COUNCIL ON DENTAL THERAPEUTICS

## COUNCIL LISTS PRODUCTS FOR "ACCEPTED DENTAL REMEDIES"

THE most important factor in the of the American Dental Association announces the inclusion of the following products in the list of *Accepted Dental Remedies:*

### Penicillin and Streptomycin[1]

*Crystalline Penicillin G Potassium in Oil and Wax—Abbott, 300,000 units:* Each cubic centimeter contains crystalline penicillin G potassium, 300,000 units in a menstruum of peanut oil and 4.8 per cent beeswax. Marketed in 10 cc. vials.

*Crystalline Penicillin G (Sodium Salt) in Oil and Wax—Abbott, 300,000 units:* per cubic centimeter in B-D[2] 1-cc. glass cartridges with B-D Disposable Cartridge Syringe. Crystalline penicillin G (sodium salt) suspended in peanut oil containing 4.8 per cent (w/v) white wax.

*Crystalline Penicillin G Potassium—Abbott:* In vials, each containing 100,000 units; 200,000 units; 500,000 units, and 1,000,000 units. Manufactured by Abbott Laboratories, North Chicago, Ill.

*Penicillin Calcium Troches—Premo:* Each troche is stated to contain 5,000 units of penicillin calcium together with milk sugar, cane sugar, starch, talcum, zinc stearate, color and flavor.

*Tablets Buffered Penicillin—Premo (50,000 Units):* Each tablet is stated to contain 50,000 units of penicillin calcium together with calcium carbonate,

1. A.D.R., Ed. 13, p. 104.
2. Trademark registered by Becton, Dickinson & Company.

powdered cane sugar, acacia, zinc stearate, talcum and color. In bottles of 12 and 100 tablets.

*Tablets Buffered Penicillin—Premo (100,000 Units):* Each tablet is stated to contain 100,000 units of penicillin calcium together with calcium carbonate, powdered cane sugar, acacia, zinc stearate, talcum and color. In bottles of 12 and 100 tablets. Manufactured by Premo Pharmaceutical Labs., Inc., New York, N. Y.

*Penicillin Calcium Troches, Soluble —Squibb:* Each troche is stated to contain 5,000 units of calcium penicillin together with karaya gum; magnesium stearate; acacia; mineral oil, light; sucrose powder, and flavoring. Manufactured by E. R. Squibb & Sons, New York.

### Phenolic Compounds[3]

*Sanford's Solution:* Each 100 Gm. is stated to contain denatured alcohol, 70 Gm.; cresol, U.S.P., 2.0 Gm.; glycerin, 5 Gm. and distilled water, 23 Gm. Manufactured by Sanford & Son, Los Angeles, Calif.

*Eugenol — King's Specialty Co.:* A brand of eugenol, U.S.P. Distributed by King's Specialty Company, Ft. Wayne, Ind.

### Hemostatics[4]

*Gelfoam, Size 12, Sterile Absorbable Gelatin Sponge:* A water-insoluble, porous matrix which serves as a surgical sponge in providing hemostasis. The size refers to the surface area of each gelatin section, 12 square cm. The sections are 20 mm. wide, 60 mm. long and 7 mm. thick. Each package contains four sections.

*Properties:* Gelfoam is a light, off-white, nonelastic, tough, porous matrix that may be cut into any shape or size. It shows no tendency to disintegrate even with relatively rough handling. A piece of Gelfoam may be wetted rapidly by working it vigorously between moistened fingers, and it then will imbibe water readily. A 10 mm. cube of Gelfoam weighs about 9 mg. and will take up approximately 50 times its weight of water or 45 times its weight of well agitated oxalated whole blood. Gelfoam will withstand dry heat at 149 C.

*Actions and Uses:* Gelfoam serves as an absorbable surgical sponge. It is stated that when it is implanted in tissues, it is completely absorbed in from four to six weeks without inducing excessive scar tissue formation or excessive cellular reaction. It may be used to control capillary bleeding, particularly when moistened with thrombin solution.

*Dosage:* Gelfoam may be applied to the bleeding surfaces in amounts sufficient to cover the area. For such purposes Gelfoam first should be moistened thoroughly with sterile saline solution or thrombin solution.

Manufactured by the Upjohn Company, Kalamazoo, Mich. Patent applied for. Trademark registered in U. S. Patent Office, Serial No. 429268, April 29, 1947.

Admission of a product to the list of *Accepted Dental Remedies* means that the product and the methods by which it was marketed at the time of consideration were not found to be in violation of the Council's published rules. Accepted products are reconsidered periodically. The files of the Council contain information on many drugs and dental cosmetics which is available on request, and inquiries are welcomed. *—Donald A. Wallace, Secretary.*

3. A.D.R., Ed. 13, p. 110.
4. *A.D.R.*, Ed. 13, p. 129.

## DENTIFRICES:

## QUESTIONS AND ANSWERS

THIS is one in a series of questions and answers papers which are prepared by qualified experts at the request of the Council on Dental Therapeutics. Other papers in preparation deal with prescription writing and general anesthesia.

**Q.** Do the most popular paste and powder dentifrices contribute significantly to the formation of cervical notches in the teeth?

A. Many factors may play a role in the production of cervical grooves. It has not been adequately demonstrated that the popular brands of dentifrices, properly used, are an important contributing factor.

**Q.** Do any of the most widely used dentifrices contain silica or pumice?

A. Small amounts of silica which may be present in some of them are clinically insignificant. So far as we know, none of the most widely used dentifrices contains pumice.

**Q.** Are some widely used dentifrices unnecessarily abrasive?

A. All popular pastes and powders contain some abrasive. Unnecessary abrasiveness may be contributed by some grades of calcium carbonate, sulfate or phosphate. The abrasives that are accepted by the Council on Dental Therapeutics may be applied to the teeth with safety. A few dentifrices which claim rapid cleansing power may be more abrasive than necessary.

**Q.** Do some dentifrices contain potentially harmful ingredients?

A. These are not present in most brands, but some dentifrices have been found to contain unsafe amounts of potassium chlorate, sodium perborate, orris root, silica, pumice, other unduly harsh abrasives, alum and excessive amounts of lead. It is important that the formulas for dentifrices be available to the profession.

**Q.** Do some dentifrices contain sugar?

A. Yes.

**Q.** Is sugar in dentifrices harmful?

A. We do not know. Sugar is sometimes used in tooth pastes and liquid dentifrices to replace glycerin. When supplies of glycerin are adequate, the use of sugar is not justified.

**Q.** Would the brush alone clean the teeth adequately if it were used properly?

A. Most persons need a mildly abrasive dentifrice as an adjunct to the brush for satisfactory results, but a few individuals who are not susceptible to the accumulation of strongly adherent plaques and stains are able to clean their teeth with a brush alone.

**Q.** Do "milk of magnesia" dentifrices help to prevent tooth decay?

A. They have not been demonstrated to reduce the incidence of caries.

**Q.** Is it likely that research now in progress will result in the discovery of a caries-preventing dentifrice?

A. Penicillin, dibasic ammonium phosphate and urea offer promise as therapeutic ingredients for dentifrices.

**Q.** Do some dentifrices benefit the gums?

A. The use of a dentifrice which aids in the removal of bacterial accumulations at the gingival sulcus may be beneficial to the gums because of its cleansing action. The therapeutic value of its ingredients is doubtful. Certain dentifrices contain irritating ingredients which may give the patient the impression that his gingivae are being stimulated because of the tingling sensation which follows their use. The Council on Dental Therapeutics is not aware of any beneficial effect which such dentifrices might exert on oral tissues.

**Q.** Will dentifrices eliminate bad breath?

A. Correct brushing of the teeth will remove a variable amount of material which might become foul if it were allowed to remain in the mouth. Using a dentifrice and rinsing the mouth with water may facilitate the cleansing action. Most dentifrices contain flavorings which will tend to mask normal or abnormal mouth odors. The odor from interproximal decay or from diseased soft tissues would probably not be affected, although it might be masked temporarily. It is most important, of course, that the patient rely on the dentist or physician, rather than on a dentifrice, to eliminate the cause of persistent bad breath.

**Q.** Why is the Council on Dental Therapeutics concerned about the advertising for dentifrices? They are not therapeutic agents.

A. The public receives much of its information with regard to dentistry through advertisements for dentifrices. The profession desires that that information be correct, in order that the public give proper emphasis to oral hygiene without undue reliance on dentifrices for the prevention of dental caries and diseases of the periodontal tissues.

**Q.** Should a dentifrice be acid or alkaline?

A. A dentifrice should not be acid enough to attack the teeth or alkaline enough to irritate or inflame gingival tissue. Between these rather broad limits acidity or alkalinity is not important.

**Q.** What is the difference between tooth paste and tooth powder?

A. In addition to the ingredients of tooth powders, pastes contain fluids such as glycerin, propylene glycol, sorbitol solution, water, or alcohol, together with binders such as tragacanth, karaya, starch or methyl cellulose. The cleansing properties of dentifrices depend on their abrasive constituents, and powders do not differ fundamentally from pastes in this respect.

**Q.** Why does the Council on Dental Therapeutics ask that the composition of dentifrices be made public?

A. Since any dentifrice can be duplicated by competent pharmaceutical chemists, there is no legitimate reason why such information should not be made public. A hypothetical example may be cited to illustrate the practical bad effects of secrecy. Suppose a patient who is sensitive to orris root uses a secret-formula tooth powder which contains orris root. The patient may suffer any or all of a variety of unpleasant and disabling symptoms until his dentist or physician discovers, perhaps by writing to the Council on Dental Therapeutics, that the tooth powder may be the cause of the trouble. Much valuable time may elapse before the cause is suspected in such instances.

**Q.** Are lead tubes suitable tooth paste containers?

A. If they are properly lined, yes. In

the United States, most tooth paste tubes now consist principally of lead. Tin or aluminum are preferable, however, and probably will be adopted by most manufacturers when they are available in sufficient quantity.

## STATUS OF DENTIFRICES AND MOUTHWASHES WHICH CONTAIN DIBASIC AMMONIUM PHOSPHATE AND UREA

SCIENTIFIC investigations indicate that various derivatives of ammonia may be of value in preventing dental caries.[1, 2] A dentifrice and mouthwash, both of which contain 5 per cent of dibasic ammonium phosphate and 3 per cent of urea (carbamide), have been found to be effective in reducing Lactobacillus acidophilus counts in saliva of human subjects. However, the reduction obtained in some subjects was not sufficient to indicate an arrest of caries.

Clinical investigation of these preparations has not progressed far enough to show whether their use will reduce the incidence of dental caries.

The quantitative composition of the mouth rinse and dentifrice are as follows:[2]

| Rinse | Gm. or cc. |
|---|---|
| Dibasic ammonium phosphate | 50.0 |
| Carbamide | 30.0 |
| Glycerin | 100.0 |
| Alcohol | 40.0 |
| Soluble saccharin | 1.0 |
| Menthol | 0.4 |
| Liquor amaranth (U.S.P.) | 2.0 |
| Sodium benzoate | 1.0 |
| Distilled water q.s. | 1,000.0 |

| Powder | Gm. or cc. |
|---|---|
| Dibasic ammonium phosphate | 50.0 |
| Carbamide | 30.0 |
| Bentonite | 50.0 |
| Calcium carbonate (ppt.) | 866.0 |
| Soluble saccharin | 2.0 |
| Menthol | 2.0 |
| Oil of peppermint | 2.0 |
| Oil of cinnamon | 1.9 |
| Oil of wintergreen | 6.0 |
| Duponal | 10.0 |

The Council wishes to encourage further investigation of products of this character. It is the Council's understanding that extensive studies already are under way.[3]

The experimental preparations described here appear to be harmless, provided pure chemicals and abrasives of dentifrice grade are used in their manufacture. It should be emphasized that some grades of bentonite are harshly abrasive. The Bureau of Chemistry will be pleased to suggest suitable bentonite, although none is listed in *Accepted Dental Remedies* at this time.

The Council has authorized publication of this report.

1. Kesel, R. G., and others, The Biological Production and Therapeutic Use of Ammonia in the Oral Cavity in Relation to Dental Caries Prevention. *J.A.D.A.* 33:695 (June 1) 1946.
2. Kesel, R. G., and others, Ammonia Production in the Oral Cavity and the Use of Ammonium Salts for the Control of Dental Caries. *Am. J. Orthodont. & Oral Surg.* (Oral Surgery Section) 33:80 (February) 1947.
3. Effects of Tooth Brushing To Be Studied in Illinois. *J.A.D.A.* 35:894 (December 15) 1947.

## PRELIMINARY COMMENTS ON DENTAL PRODUCTS

In order to provide helpful information promptly, the Council on Dental Therapeutics has authorized the publication of preliminary comments concerning commercial preparations which are within its scope. The comments are limited to clear-cut facts and references to previously published information and written opinions. The Council will authorize the publication of comprehensive status reports at a future time if they appear to be needed and will accept those products which, on investigation, are found to be eligible for inclusion in *Accepted Dental Remedies* in accordance with its rules.

The products listed below have not been accepted by the Council.

### Dayamin Products

*Dayamin Capsules:* Each capsule is stated to contain thiamine hydrochloride, 5 mg.; riboflavin, 5 mg.; nicotinamide, 25 mg.; pyridoxine hydrochloride, 1.5 mg.; pantothenic acid (as calcium pantothenate), 5 mg.; ascorbic acid, 100 mg.; vitamin A, 10,000 U.S.P. units, and vitamin D, 1,000 U.S.P. units.

*Dayamin Liquid:* Each 5 cc. is stated to contain thiamine hydrochloride, 3 mg.; riboflavin, 3 mg.; nicotinamide, 20 mg.; pyridoxine hydrochloride, 1 mg.; ascorbic acid, 75 mg.; vitamin A, 5,000 U.S.P. units, and vitamin D, 800 U.S.P. units. Apparently the liquid does not contain pantothenic acid.

The Dayamin products are advertised to the dental profession as general dietary supplements. The labels state that the need for pyridoxine hydrochloride and pantothenic acid in human nutrition has not been established. The amounts of thiamine hydrochloride, nicotinamide and vitamin D in one of the capsules or in 5 cc. of the liquid exceed the daily allowances recommended by the Food and Nutrition Board of the National Research Council[1] for moderately active adults. The Food and Nutrition Board recommends supplements of vitamin D only for children, pregnant and lactating women, elderly persons and those who have no opportunity for exposure to clear sunshine.

The interested reader may wish to refer to "Council Announces Provisions for Acceptance of Multivitamin Preparations," *J.A.D.A.* 35:900 (December 15) 1947, and "Nutritional Factors," *Accepted Dental Remedies,* thirteenth edition, 1947, page 182.

### Obtundia Surgical Dressing

*Obtundia Surgical Dressing:* This product is stated to contain meta-cresol and camphor in combination, anethol, eugenol, geraniol, thymol iodide, balsam of Peru and pine oil. It is a dark brown, thin liquid.

The label indicates that Obtundia Surgical Dressing is for external use only, as a topical anesthetic, for surface injuries, burns, or itching from bites or stings of insects and as an antiseptic for surface cleansing. Directions for use for toothache are included.

The advertising recommends its use for alveolar abscesses, dry sockets, gagging, irritated tissue, nerve extraction, pericementitis, postoperative pain, preoperative preparation of lips, putres-

cent root canals and sensitive dentin.

Meta-cresol and eugenol are phenols. There is some evidence that combination of camphor with various phenols may result in loss or diminution of the corrosive action which would be characteristic of the pure phenol. Apparently Obtundia Surgical Dressing is compounded on this principle.

The firm has not submitted a quantitative statement of composition or clinical evidence in support of the therapeutic claims made for its product.

### Coago Pads

*Coago Pads:* A routine inquiry for information concerning this product was sent to the manufacturer on August 20, 1947. A reply has not been received. Samples of Coago were purchased.

The statement on the label indicates that the pads contain ferric subsulfate and tannic acid. They consist of two layers of white fibrous material, apparently cotton, with an intermediate layer of gray granules.

Clinical evidence of the usefulness or safety of the pads as a hemostatic agent is not available to the Council.

### Mu-Sol-Dent

*Mu-Sol-Dent:* A report on this mouthwash appeared in *J.A.D.A. 15*:1977 (October) 1928. The product is currently marketed by a different firm, which stated in a letter dated October 21, 1947 that Mu-Sol-Dent contains tribasic sodium phosphate, sodium chloride, potassium chloride, glycerin, alcohol, water, flavors and color. The preparation is alkaline and has a pH value of approximately 11.0.

Mu-Sol-Dent is advertised to the dental profession and the general public. The advertising states that "Mu-Sol-Dent does far more than freshen and sweeten your breath—it helps prevent formation of mucin plaques and tartar—two major causes of tooth decay." The firm was asked to send to the Council office evidence to support the claims made for Mu-Sol-Dent. No evidence has been received. The Council is not aware that the use of any mouthwash will bring about a reduction in the incidence of dental caries, nor is it aware that the presence of tartar increases the incidence of caries.

For further information and suggestions concerning mouthwashes, the reader may wish to refer to "What Mouth Wash Shall I Use?" in *J.A.D.A. 33*:911, July 1, 1946, and to the chapter on "Mouth Washes" in *Accepted Dental Remedies*, edition 13, 1947, page 177.

### Menax

*Menax:* This product is a red ointment, packaged in collapsible tubes. According to the label, Menax is "the ideal treatment after extraction . . . relieves pain and prevents infection." The manufacturers state that their dentist customers recommend it to patients to relieve soreness from dentures.

The statement of composition supplied by the manufacturer indicates that 100 Gm. of ointment contains benzocaine, 0.3 Gm.; menthol, 0.3 Gm.; camphor, 0.3 Gm.; methyl salicylate, 1.2 Gm.; white petrolatum, and vegetable color.

Information and suggestions with reference to topical anesthetics may be found in *Accepted Dental Remedies*, thirteenth edition, pages 69 to 71, 224 and 226.

## SECOND NATIONAL HEALTH ASSEMBLY

## HELD IN WASHINGTON, D. C., MAY 1 TO 4

MORE than 800 persons attended the National Health Assembly held in Washington, D. C., May 1 to 4. The assembly, under the general chairmanship of Oscar R. Ewing, was held at the request of President Truman to develop a ten year program of feasible health goals for the country. Unlike a similar assembly held ten years ago which was noted for its fanfare, recriminations and hysterical outbursts, this year's assembly was conducted in a businesslike, orderly, unemotional manner. Many differences of opinion were expressed regarding the health needs of the country and methods of meeting those needs, but the participants exchanged views and opinions calmly and dispassionately.

The assembly was divided into fourteen panels, each of which studied and reported on one phase of the country's health problem. The section topics embraced medical research, medical care, professional personnel, hospital facilities, local public health units, chronic disease and the aging process, maternal and child health, rural health, community planning, rehabilitation, dental health, mental health, nutrition and sanitation.

### Dental Health Representatives

Dentistry was well represented at the assembly. Thirty-three dentists, one physician, one dental hygienist, one dental educator and twelve lay members were invited to participate in the deliberations of the Section on Dental Health. The dental profession also was represented on all of the other sections except the one on nutrition.

The members of the planning committee of the Section on Dental Health consisted of Ernest G. Sloman, chairman; P. E. Blackerby, Jr.; Mrs. Charles D. Center; Allen O. Gruebbel, and Harry Lyons. Other members of the Section on Dental Health were: Ned Arganbright, Ira D. Beebe, Miss Ruth Bottomly, George M. Anderson, J. C. Brauer, D. W. Brock, M. D. Clawson, Mr. Melvin Dollar, Clifton O. Dummett, L. A. Gerlach, Harlan H. Horner, Miss Margaret Jeffreys, W. A. Jordan, Kenneth A. Easlick, Miss Hazel V. Dudley, Marion H. Gray, Jasper A. Hennigar, Theodore Kaletsky, Mr. Dorsey Kirk, H. M. Kulstad, Edward D. Leifer, R. C. Leonard, Leon R. Kramer, Donald H. Miller, Mrs. William S. Murray, Harold J. Noyes, Mrs. John A. Jones, Oren A. Oliver, Harold W. Oppice, Mrs. James C. Parker, John W. Ross, Leo J. Schoeny, Alfred E. Seyler, Miss Annie Taylor, R. M. Walls, William D. Wellock, H. B. Washburn, Miss S. Virginia Wilson, Walter A. Wilson, Carl Wilzbach, Mr. Kenneth Kelly, O. W. Brandhorst and Mr. Reuben G. Soderstrom.

Dental personnel on sections other than dental health were: Professional Personnel, John T. O'Rourke, John E. Buhler, Russell W. Bunting, J. Ben Robinson, Willard C. Fleming, Harlan H. Horner; Hospital Facilities, Malcolm W. Carr; Local Health Units, R. C. Dalgleish; Chronic Diseases, Isaac Schour; Maternal and Child Health, J. A. Salzmann; Rural Health, Clyde E. Minges; Research, Allan G. Brodie; Medical Care, A. J. Asgis, Frank J. Houghton, G. D. Timmons; Community Planning, Carl L. Sebelius; Rehabilitation, William McGill Burns; In-

dustrial Health and Safety, J. M. Dunning; Environmental Sanitation, H. B. G. Robinson.

Following is a summary of the recommendations presented by the Section on Dental Health to the general assembly at its final meeting:

### The Dental Health Problem

Dental diseases afflict more than 90 per cent of the people. The need for dental health service begins early in life and accumulates into a backlog of unmet needs as children become adults. Dental caries is the greatest cause of the loss of teeth during the early part of life and carious lesions accumulate many times faster than they are corrected. As high as 50 per cent of 2 year old children have one or more decayed teeth. When he is 16, the average person has seven decayed, missing, or filled teeth. Diseases of the gums and supporting structures of the teeth, including pyorrhea, are mainly responsible for the loss of teeth in later years. Facial deformities resulting from abnormal arrangement of the teeth, diseased gums, accidents to teeth and anomalies, such as cleft lip and palate and impacted teeth, also are evident in a large number of children and adults.

The most logical and effective means of ultimately bringing better dental health to the American people is adequate dental service for children. The broadest possible application of recognized preventive and control measures should be made early in life so that the later needs for dental services are reduced to a minimum. Yet it must be recognized that the solution of the dental health problem in this country also involves the prevention and control of dental diseases among adults.

### Principles for Dental Health Programs

A program for the achievement of dental health goals in the next decade, therefore, should be based on the following principles:

1. *Research.* Adequate provisions should be made for research which may lead to the prevention or control of dental diseases.

2. *Dental Health Education.* Dental health education should be included in all basic educational and treatment programs for children and adults.

3. *Dental Care.* (a) Dental care should be available to all regardless of income or geographic location as rapidly as resources will permit. (b) Programs developed for dental care should be based on the prevention and control of dental diseases. All available resources should first be used to provide adequate dental treatment for children and to eliminate pain and infection for adults. (c) Dental health is the responsibility of the individual, the family and the community, in that order. When this responsibility, however, is not assumed by the community, it should be assumed by the State and then by the Federal government. The community in all cases should determine its methods for providing service.

4. *Participation in Program Planning.* In all conferences that may lead to the formation of a plan for dental research, dental health education and dental care, there should be participation by authorized representatives of the dental profession.

### Goals for Dental Health Programs

Goals to be reached during the next decade through these principles are:

1. Prevention of dental disease through the application of effective preventive technics.

2. Control of dental diseases by making dental treatment and dental health education available to every chiild as rapidly as resources will permit.

3. Increased facilities for dental care in all hospitals and health centers.

4. Improved distribution of dentists between urban and rural areas and an increase in the number of qualified dental practitioners in the nation.

5. Training and utilization of additional auxiliary personnel – dental hygienists, dental assistants and dental technicians.

Specific recommendations for the achievement of these goals are:

### Research

The Federal government should immediately make provision for expanded research in the field of dental health. The Federal government should also make funds available for administrative research to plan and conduct studies and experimental programs in selected communities to evaluate various types of dental care programs for such groups as school children, the indigent, low income groups and residents of rural areas. Such programs should include various types of voluntary prepayment plans, part payment programs, preventive care programs and the development of various methods for providing dental care to children on different economic levels.

A commission should be created to define standards for dental health care more explicitly.

### Dental Health Education

Further experimentation on the part of all agencies in the technics of dental health education is essential so that authoritative dental health facts can be selected and interpreted in understandable terms for all levels of society. Additional courses in dental health education should be provided in all institutions which train personnel for the fields of health and education.

### Dental Health Services

The dental profession should utilize to the fullest extent the following measures of prevention and control together with such extensions as advancing dental science may reveal:

1. Routine prophylaxis and examinations.

2. Topical applications of sodium fluoride.

3. Utilization of diagnostic aids, such as lactobacillus counts.

4. Completion of all indicated dental treatment.

5. Full utilization of preventive orthodontics.

6. Development of programs to combat the environmental hazards associated with occupations.

### Financing Dental Health Care

When indicated by needs established at the local level, Federal and State governments should participate in the financing of dental health programs. In all cases, the local communities should determine the policies governing such programs.

Federal compulsory health insurance should not be employed as a means of providing dental health care.

### Dental Personnel

To offset the current shortages of dental personnel in the United States, Federal aid should be granted to dental schools in the form of scholarships and fellowships and dental schools should be operated at full capacity. Federal grants should be made available to all accredited dental schools for the construction and equipment of dental facilities and for assistance in maintenance and operation and research. Additional dental schools should be established in areas of recognized need. Federal aid should not supplant but should augment State, regional and private support of dental schools. In all cases, Federal grants should not imply any form of intervention in the management or control of the recipient institution.

Encouragement should be given to the admission of qualified Negro students to dental schools and effort should be made to expand the opportunities for Negroes to secure dental education.

Additional courses should be established for the training of dental hygienists, assistants and technicians under the auspices of accredited dental schools or other educational institutions operated on a nonprofit basis.

In any program for the procurement of additional dental services for the population, present high standards of dental practice should not be reduced.

### The President's Views

A feature of the first day's meeting was a luncheon in observance of Child Health Day, designated by Presidential proclamation. Speakers urged carrying out of the President's recommendations that "as a first step practical plans be developed to obtain thorough medical and dental examinations, and treatment if necessary, for every child entering school for the first time in the fall of 1948, to the end that all correctable defects found in the health of these children shall have been removed and placed under treatment by the close of the school year."

President Truman, speaking at the second general meeting, scored Congress for failing to enact the most vital points of his program. He reiterated his demands for universal military training, a department of health and welfare, a new hospital program, a very great extension of social security and a greater attention to rehabilitation of the crippled. He said he still believed in the 21-point program in health and welfare which he had sent Congress on September 6, 1945.

### Section on Medical Care

The President's remarks provided additional material for discussion by the Section on Medical Care which was the most controversial section in the whole assembly. Leaders agreed that the health services of the country must be improved but disagreed as to whether the improvement should be attempted by voluntary or compulsory programs. Dr. Ernest P. Boas of New York led the group that favored a national compulsory health insurance plan such as the government has proposed. Dr. R. L. Sensenich, president-elect of the American Medical Association, led the opposition. He described government plans in such fields as "always clumsy." He said the best social system is one that gives people the opportunity to "do for themselves."

The planning committee of the Section on Medical Care pointed out that "medical care" included the services of physicians, dentists, nurses and hospitals, and the provision of drugs, orthopedic appliances, and eye glasses. The committee agreed on seven main points but was not ready to report on an eighth point which covered compulsory health insurance.

The seven points adopted by the Section on Medical Care are:

1. Adequate medical service for prevention of illness, care and relief of sickness and promotion of a high level of physical, mental and social health should be available to all without regard to race, color, creed, residence or economic status.

2. The principle of contributory health insurance should be the basic method of financing medical care for the large majority of the American people, in order to remove the burden of unpredictable sickness costs, abolish the economic barrier to adequate medical services and avoid the indignities of a "means test."

3. Health insurance should be accompanied by such use of tax resources as may be necessary to provide additional

a. Services to persons or groups for

whom special public responsibility is acknowledged and

b. Services not available under prepayment or insurance.

4. Voluntary prepayment group health plans, embodying group practice and providing comprehensive service, offer to their members the best of modern medical care. Such plans, furthermore, are the best means available at this time of bringing about improved distribution of medical care, particularly in rural areas.

5. The people have the right to establish voluntary insurance plans on a cooperative basis and legal restrictions upon such right (other than those necessary to assure proper standards and qualifications), now existing in a number of States, should be removed.

6. High standards of service, efficient administration and reasonable costs require:

(a) Coordination of the services of physicians, hospitals and other health agencies in all phases of prevention, diagnosis and treatment;

(b) Effective cooperation between the providers and the consumers of such services.

7. A medical care program itself will not solve the health problems of the Nation. It must be coordinated with all efforts directed toward providing the people with adequate housing, a living wage, continuous productive and creative employment under safe working conditions, satisfying recreation and such other measures as will correct conditions that adversely affect the physical, mental and social health of the people.

### Section on Research

The Section on Research, of which Dr. A. C. Ivy was chairman, adopted a resolution upholding the use of live animals for experimentation as indispensable to progress in treating man's ailments. The resolution pointed out that practically every surgical operation performed today was perfected on animals before it was tried on humans. The provision of funds for research in medicine and other sciences "would be negated if the humane use of animals, such as mice, guinea pigs, monkeys and dogs, for experimental purposes should be restricted in any way."

### World Health Organization

A resolution was introduced at one of the general sessions to request Congress to approve the World Health Organization. Mr. Ewing requested that no action be taken on this or any other resolution that might affect pending federal legislation. It was apparent, however, that members of the assembly strongly favored joining of the World Health Organization by the United States.

# LEGISLATION

## COMMITTEE DISCARDS A.D.A. BILL; APPROVES MODIFIED SUBSTITUTE

The Committee on Interstate and Foreign Commerce of the House of Representatives discarded the A.D.A. dental research bill on May 12 in favor of a limited measure offered as a last minute substitute by Congressman W. E. Brehm (R., Ohio), one of the original sponsors of the Association measure.

The new Brehm bill (H.R. 6470) was favorably reported by the Committee despite objections from Association officials. The modified bill provides only for federal grants up to $750,000 to dental schools, universities and other institutions for the support of dental research projects. The principal provision of the original bill, providing for an appropriation of $2,000,000 for the establishment of a national dental research institute at Bethesda, Md., was deleted entirely.

The Brehm bill was introduced only a few days before the Committee met to consider the original measure sponsored by the Association which had already been passed by the Senate. The Brehm bill was approved without a public hearing. Association officials pointed out that elimination of the provision for a research institute defeated the original purpose of the Association measure which has been before Congress for seven years.

Rep. Brehm told Association representatives that he would attempt to restore the deleted provision for a dental research institute when the bill goes to conference with a Senate committee.

A report of the results of the Senate-House of Representatives conference will be published in a future issue of THE JOURNAL.

## SEN. THOMAS PROPOSES FEDERAL AID FOR DENTAL EDUCATION

Direct federal government grants to schools of dentistry, medicine, nursing and public health and the award of scholarships to students on a merit basis are proposed in a new bill introduced into the United States Senate by Elbert D. Thomas (D., Utah). The bill (S. 2588) was referred to the Senate Committee on Labor and Public Welfare. A number of provisions of the bill were similar to recommendations made by dental delegates at the recent National Health Assembly in Washington.

Provisions of the bill of interest to dentists include annual grants of $8,000,000 to dental schools and additional grants of up to 50 per cent of the cost of new construction for educational facilities. It also is provided that dental schools, to qualify for federal aid, must not impose unreasonable restrictions against the admission of out-of-the-state residents and must not bar students on the basis of race, color, national origin or creed.

The bill further prohibits interference by any governmental agency or federal official in the administration or control of any recipient institution. State scholarships, limited to tuition and books, are proposed for students of dentistry.

## NEW STEPS TAKEN TO REVISE V.A. DENTAL SERVICE PROGRAM

Representatives of the American Dental Association have requested conferences with high government officials in an effort to correct the rapidly deteriorating dental program of the Veterans Administration. Principal criti-

cism of the present V.A. program is that it has grown into a clinic type of service in many areas.

Agreements with the dental profession made shortly after the close of the war by V.A. officials are being ignored. Present V.A. officials, with authority to act, have refused to examine objectively the present status of the dental treatment program. Instead, the program has been left in the hands of minor officials who apparently are without either authority or inclination to revise faulty regulations and procedures.

Officials of the Association also have requested conferences with officers of the leading veterans' organizations to discuss the problem.

## INTRODUCE EXCESS PROPERTY BILL FOR EDUCATIONAL PURPOSES

A bill, S. 2389, to authorize the secretaries of the Army, the Navy and the Air Force to donate excess and surplus property for educational purposes recently was introduced into the United States Senate by Senators Raymond Baldwin (R., Conn.), Lister Hill (D., Ala.), and Holland (D., Fla.).

The enactment of this bill would authorize the donation of excess dental equipment and supplies to dental schools. Section 2 of the bill states that ". . . property . . . shall be allocated on the basis of needs and utilization by the United States Commissioner of Education for transfer by the owning agency directly to schools, colleges, or universities or to State Departments of Education, for distribution by the State to tax-supported schools, colleges, and universities. . . ."

## INTRODUCE PUBLIC HEALTH BILL IN HOUSE OF REPRESENTATIVES

A bill to assist the states in the development and maintenance of local public health units recently was introduced into the United States House of Representatives by Congressman James I. Dolliver (R., Iowa).

The following is a statement of the policy of the bill, H.R. 5644:

> . . . it is therefore the policy of the Congress, and the purpose of this Act, in the promotion of the general welfare and in the interest of national security, to assist the States through the measures provided for in this Act, in developing and maintaining local public-health units organized to provide basic full-time public-health services in all areas of the Nation and in the training of all types of personnel for local public-health-unit work. . . .

H.R. 5644 is the companion bill to S.2189, introduced into the Senate by Senators Leverett Saltonstall (R., Mass.), Guy Cordon (R., Ore.), and Lister Hill (D., Ala.).

The National Congress of Parents and Teachers is backing the bill, which has nonpartisan support both in Congress and in farm, labor and women's groups.

The proposed legislation is a result of the fact that more than forty million Americans are now living in communities that do not have the services of a full time public health department and many communities are without any public health services at all.

## MORSE INTRODUCES BILL TO AMEND NATIONAL SECURITY ACT OF 1947

Senator Wayne Morse (R., Ore.) on March 29 introduced a bill, S. 2523, into the U. S. Senate to amend the National Security Act of 1947 in order to provide for a single executive department for the operation and administration of the Army, the Navy and the Air Force under a Secretary of Defense.

The bill provides for the establishment of integrated policies and procedures for the departments, agencies, and functions of the government relating to the national security and for the coordination and unified direction of the

armed forces under civilian control.

In establishing the Department of Defense, the offices of secretaries of the Army, the Navy and the Air Force; the offices of under secretaries of the Army, the Navy and the Air Force, and the offices of assistant secretaries of the Army, the Navy and the Air Force would be abolished, and the functions, powers, and duties vested in and imposed upon such officers would be vested in and imposed upon the Secretary of Defense.

# A. D. A. AFFAIRS

## APPLICATION BLANK FOR HOTEL ACCOMMODATIONS IN JOURNAL

On pages A-44 and A-45 of this issue of THE JOURNAL a map of downtown Chicago, showing hotels and points of interest, and an application for hotel accommodations have been printed for the convenience of those wishing to attend the annual session of the American Dental Association, September 13 to 17.

Delegates will be housed at the Hotel Sherman where sessions of the House of Delegates will be held.

Two thousand extra copies of the map and the application blank, together with instructions for completing the blank, have been printed. For extra copies of the application blank and map, write to the Office of the Business Manager, American Dental Association, 222 E. Superior St., Chicago 11.

## CHICAGO MEETING TO FEATURE IMPORTANT SCIENTIFIC EXHIBITS

The Committee on Health and Scientific Exhibits of the American Dental Association will present some notable scientific exhibits at the coming annual convention.

Among the subjects to be shown are Oral Cancer, Caries Etiology and Prevention, Treatment Planning for Children, Pulp Reaction to Dental Cements, Topical Application of Sodium Fluoride, Cleft Palate Treatment and Rehabilitation, and Vitamins.

A few spaces are still available. Individuals or institutions having exhibits providing scientific information—medical or dental—should write to the secretary of the Committee on Health and Scientific exhibits for information. J. M. Wisan, 222 E. Superior St., Chicago 11, is the secretary; members of the committee are: Walter W. Briggs of Attleboro, Mass.; E. Horace Jones of Cincinnati, Ohio; Leo W. Kremer of Chicago; H. B. G. Robinson of Columbus, Ohio, and Leuman M. Waugh of New York.

## CANCEL SCHEDULED MEETING OF THE A.D.A. BOARD OF TRUSTEES

The Board of Trustees has cancelled the special meeting which had been scheduled for the Memorial Day week end in Chicago for the purpose of revising budget requests for the last half of 1948 and the full calendar year of 1949. Instead the Board will meet several days in advance of the annual A.D.A. session in Chicago next September to consider fiscal problems of the Association.

Pending the September meeting of the Board, all committees, departments and other agencies have been directed to hold expenditures to a minimum.

## ASSOCIATION OFFICIALS HOLD MILITARY DRAFT SESSION

Officials of the American Dental Association held a special meeting in Chicago, April 18, to consider the dental aspects of the selective service bill recently introduced into Congress by Representative Walter G. Andrews (R., N. Y.).

Attending the conference were H. B. Washburn, president; Harold Hillen-

brand, secretary; L. M. Cruttenden and C. Willard Camalier, assistant secretaries; Robert T. Curren, chairman of the Committee on Military Affairs; Carl O. Flagstad, chairman of the Committee on Legislation; Lon W. Morrey, editor of THE JOURNAL; Allen O. Gruebbel, secretary of the Council on Dental Health; Shailer Peterson, Director of Educational Measurements of the Council on Dental Education, and Harold W. Oppice, trustee of the Eighth District of the Association.

It was the consensus of those present that Congress be requested to consider the following recommendations in preparing the final bill:

That dentists, regardless of their age, who are called to active duty, be commissioned and utilized in their professional capacity in the armed services.

In addition to the deferment of dental students, a reasonable pool of predental students who may be within the age categories of the draft, be deferred so as to assure a normal class of dental students in the coming years.

The creation of a special civilian board, directly responsible to the President, with similar functions as the former Procurement and Assignment Service, to evaluate the needs of the armed services and civilian dental services. This Board should be given the authority by law to procure dentists to serve as officers in the Dental Corps.

Dr. Flagstad incorporated these recommendations in the statement which he presented at hearings held by the Committee on Armed Forces, April 20 in Washington, D. C. A full report of Dr. Flagstad's statement will be published in an early issue of THE JOURNAL.

## COUNCIL ON DENTAL THERAPEUTICS REPORTS ON ANNUAL MEETING

At its annual meeting, March 26 and 27 held at the Drake Hotel, Chicago, the Council on Dental Therapeutics discussed the latest developments in the field of therapeutics and made certain revisions in its general policies. One of the most important revisions concerns the rules which govern the Council in its consideration of therapeutic products that have become established as useful in dental practice through extended clinical experience.

The Council voted that new therapeutic products which meet reasonable standards of safety when used according to directions be accepted for clinical trial subject to consideration in accordance with the usual procedures, provided the available evidence indicates that they are potentially useful in dentistry. Old products for which new evidence of usefulness appears will be considered as new products. Such products will not be permitted to bear the Seal of Acceptance, and all labels and advertisments must bear a suitable explanatory statement.

Products which are accepted for clinical trial will be re-examined annually. They will be granted full acceptance when they have been established as useful in dental practice, provided they continue to be marketed in accordance with the rules of the Council. If experience indicates that they are not useful, or that they are not as safe as they were originally thought to be, they will be declared unacceptable.

The Council also voted to consider for acceptance mixtures of vitamins provided evidence adequate to justify the proportions of the ingredients is available. It will also consider for acceptance all mixtures which meet reasonable standards of safety and effectiveness provided claims are not made for ingredients which have not been shown to be useful.

The Council reviewed its policies with regard to the topical use of sulfonamides in the light of the scientific evidence which has been accumulated during the past year and decided that no change in the status of topical sul-

fonamides in dental practice was warranted at this time. The Council decided not to consider brands of sulfathiazole for acceptance and to add a warning statement to its description in Accepted Dental Remedies.

The secretary of the Council made a progress report on the Council's long term study of the prevalence, causes and possible methods for prevention or treatment of occupational dermatitis among dentists. The Bureau of Chemistry reported on new specifications for local anesthetics.

A complete report of the Council meeting will appear in a future issue of THE JOURNAL.

## AMERICAN ASSOCIATION OF DENTAL SCHOOLS HONORS HORNER

Harlan H. Horner, secretary of the Council on Dental Education of the American Dental Association, will be honored at a testimonial dinner on June 21, during the twenty-fifth annual meeting of the American Association of Dental Schools to be held at the Hotel Statler in Buffalo, June 21 to 23.

Dr. Horner, who retires as secretary of the Council on Dental Education this year after serving in that capacity for eight years, will be honored for the excellent service he has given to the advancement of the dental profession.

## A.D.A. LIBRARY REQUESTS JOURNALS FROM DENTAL SOCIETIES

The Bureau of Library and Indexing Service reports that many state and local societies are failing to send in copies of journals, programs and other official publications. These are needed for the permanent files of the Bureau.

Editors and officers are requested to send two copies of all publications, including programs of annual meetings, to Mr. Murrell Wellman, Librarian, American Dental Association, 222 E. Superior St., Chicago.

# DENTAL SOCIETIES

## HOLD SEVENTH PACIFIC COAST DENTAL CONFERENCE IN JULY

The seventh Pacific Coast Dental Conference will be held in Salt Lake City, July 12 to 16. Participating at the conference are the following essayists: Harold Hillenbrand of Chicago, Edward L. Ball of Cincinnati, Ralph L. Ireland of Lincoln, Neb., H. L. Harris of Denver, Don H. Bellinger of Detroit, A. H. Schmidt of Lincoln, Neb., Stanley D. Tylman of Chicago and Charles K. Kendall of Milwaukee.

In addition to the above named essayists there will be approximately thirty-five clinicians who have been drawn from the conference area. The Pacific Coast Dental Conference, which meets every three years, includes eleven dental associations; those of California, Southern California, Washington, Oregon, Montana, Nevada, Arizona, Idaho and Utah, and the Alberta and British Columbia associations.

## NEWS OF STATE SOCIETIES MEETING IN JUNE

### Mississippi

Principal clinicians scheduled to appear at the annual Mississippi Dental Association meeting, May 31, June 1 and 2, at the Buena Vista Hotel, Biloxi, are: Charles Kendall of Milwaukee, who will speak on "Practice Management," George Teuscher of Chicago, who will discuss "Children's Dentistry," and George Matthews of Birmingham, whose subject is "Oral Surgery and Radiography."

### Wyoming

The 1948 annual meeting of the Wyoming State Dental Association will be held June 21 to 23 in Rock Springs. Scheduled to appear at the meeting are: K. A. Easlick of the University of Michigan School of Dentistry, F. A. Arnold,

Jr., of the National Institute of Health, Washington, D.C., and R. C. Dalgleish, dental director of the Idaho State Health Department.

## IOWA STATE DENTAL SOCIETY NAMES H. I. WILSON, SECRETARY

The Iowa State Dental Society has named H. I. Wilson of Rockwell as full time secretary. Dr. Wilson succeeds A. N. Hummiston of Cedar Rapids and will assume office June 15.

This action by the Iowa society brings to a total of twelve the number of A.D.A. constituents employing full time secretaries to administer society affairs. Several other state societies, including those of Ohio and Tennessee, are considering the employment of executive secretaries.

## NEW ENGLAND STATE DENTAL OFFICERS HOLD CONFERENCE

Dental societies of all of the New England states were represented at the two day New England State Dental Officers Conference held at the Hotel Bond, Hartford, Conn., April 10 and 11. The New England states comprise the First District of the American Dental Association.

Arthur H. Ruggles, president of the Rhode Island Medical Society and president of the Council of the New England State Medical Societies, was a guest speaker. Dr. Ruggles' subject was "Medical-Dental Relations."

The Connecticut State Dental Association acted as host at the meeting.

## ELECTIONS AND OTHER ACTIVITIES OF STATE, COMPONENT SOCIETIES

### Chicago

George Edward Meyer was elected to the office of president-elect of the Chicago Dental Society on April 20. Other officers elected at that time are Paul H. Wells, vice-president and Edwin W. Baumann, treasurer. Arno L. Brett was re-elected secretary.

Robert J. Wells, president-elect last year, will assume presidency of the society on June 1.

### Dallas County

The Dallas County Dental Society was the first division to attain its quota in the current $75,000 Dallas Health Museum drive for funds to expand the Museum's educational program.

*Appearing left to right are: Henry Hicks, Earle S. Arnold, Clifford W. Vivian, Leon C. Monks, Alan L. MacDonald Arthur H. Ruggles (guest), Louis R. Siegal, Henry T. Quinn and Ira Dow Beebe, representing the Connecticut State Dental Association at the New England State Dental Officers Conference*

J. E. Leonard, president of the Dallas County Dental Society, was the chairman of the drive for the dentists. Assisting him in the direction of volunteer workers were Gilbert M. Rose, I. J. Thornton, J. C. Chambers, Jr., Paul T. Taylor, Bibb Ballard and Herbert L. Miller.

### Keely (Butler County), Ohio

Wilbur B. Caldwell of Hamilton, Ohio was honored on April 22 by members of the Keely Dental Society on the occasion of the fiftieth anniversary of his graduation from the Ohio College of Dental Surgery.

### Michigan City, (Ind.)

In cooperation with the Michigan City Dental Society, the Michigan City Kiwanis Club is attempting to locate a Negro dentist who will practice in this Indiana city of 30,000 population. Mr. R. N. Brewer, Kiwanis club president, reports that there is an excellent opportunity for a Negro dentist to establish a practice there.

Any interested dentist is invited to write to Mr. Brewer at 220 Main St., Michigan City, Ind.

### Sixth District (N.Y.)

Robert D. Orcutt of Binghamton was elected president of the Sixth District Dental Society of the state of New York during the eighth annual meeting of the society at Elmira, N. Y. Kenneth G. Houghton of Elmira was elected president-elect; L. D. Neish of Ithaca, vice-president, and Lisbon Schmeiske of Binghamton, secretary-treasurer.

# INTERNATIONAL

## DISTINGUISHED FOREIGN DENTISTS VISIT ASSOCIATION OFFICES

Recent foreign visitors to the central office of the American Dental Association included A. E. Rowlett of Leicester, England; Carlos E. de Oliva Paz of Buenos Aires, Argentina, and Foción Febres Cordero of Caracas, Venezuela.

Mr. Rowlett, who is one of England's most distinguished dentists, is a past president of the British Dental Association, and the immediate past president of the Fédération Dentaire Internationale. He recently was presented an honorary Doctor of Science degree by Temple University.

Dr. Oliva Paz represented his government on an official mission to the United States. He is the personal dentist of President Juan Peron of Argentina and the dentist for the Argentine Senate.

Dr. Febres Cordero is the dean of the Dental School of the University of Caracas. He has been visiting dental schools throughout the United States.

## CHINA, ENGLAND, BULGARIA AND POLAND PUBLISH NEW JOURNALS

Several new foreign dental journals have been received during the past month by the library of the American Dental Association. The *Journal of Dentistry* of West China Union University, a magazine in both Chinese and English, the *Journal of the British Dental Students' Association*, the *Subolekarski Pregled*, official organ of the Bulgarian Union of Dentists, and the *Czasopismo Stomatologiczne* of Poland are the new additions to world dental periodical literature.

The library is also in receipt of the first and second copies for 1948 of *Tijdschrift Voor Tandheelkunde*, a Netherlands journal. These are the first copies received since 1941.

## LATIN AMERICAN DENTAL SOCIETIES ELECT NEW OFFICERS

***Paraguay.***—The Centro de Odontología del Paraguay recently elected new officers for 1948. They are: president, Pierpont Ynsfran; vice-president, A. Lopez de Filippis; secretaries, Gustavo A. Rios and Modesto Llamosas; treas-

urer, Ruben Di Tore, and director of library and museum, Salvador Migliorisi.

*Peru.*—The Academia de Estomatología del Perú, the oldest dental society in Peru, elected new officers for the year 1948-1949, as follows: president, Jorge Villanueva Meyer; vice-president, Manuel A. Ramirez; secretary, Bánjamin Basauri; under secretary, Rómulo Hernandez; treasurer, Carlos Corneje, and librarian, J. F. Coz.

*Cuba.*—New officers of the Colegio Estomatologico Nacional (National Dental Association of Cuba) are: president, Alberto Monte Marrero; first vice-president, Jose A. Ramos Soberats; second vice-president, Horacio Alonso Loys; third vice-president, Sergio Gizuel Echevarria; treasurer, Carlos Morato Acosta; comptroller, Alfredo Gatell Diaz, and general secretary, Ricardo T. Sotres Faza.

## TWO PROFESSORS TO INSTRUCT IN UTRECHT, THE NETHERLANDS

Two American professors, George R. Moore of the School of Dentistry, University of Michigan, and Henry M. Goldman of the Harvard School of Dental Medicine, will present postgraduate courses in orthodontics and periodontia, respectively, in Utrecht, The Netherlands, early in July.

## AMERICAN DENTAL CLUB OF PARIS NAMES OFFICERS

The officers of the American Dental Club of Paris, France for 1947-1948 are F. M. Bouchon, president; R. Vieilleville, vice-president; R. Goldstein, recording secretary; H. Edwards, corresponding secretary; Lechanjour, treasurer; S. Dorian, editor, and Thibault, librarian.

The past presidents, A. Heide, J. Foure and W. S. Davenport, are members of the Executive Committee.

# DENTAL EDUCATION

## FORMER DEAN OF MEHARRY DENTAL SCHOOL DIED ON MARCH 26

Donley H. Turpin, 55, former dean of the School of Dentistry, Meharry Medical College, died on March 26 in Nashville, Tenn. Dr. Turpin taught in the Prosthetic Department of the School of Dentistry from the time of his graduation in 1918 until 1942, when ill health forced him to devote less time to teaching. From 1938 to 1942, he was dean of the dental school.

In 1947, he became dean emeritus and professor of dental history and literature; he was actively engaged in writing a history, "The Negro in American Dentistry," before his fatal illness.

Dr. Turpin was a past president of th National Dental Association. He was the Meharry College representative at meetings of the American Association of Dental Schools for a period of more than twenty years.

## TWO DENTISTS JOIN FACULTY OF MEHARRY DENTAL SCHOOL

Karl Henry, a graduate of Fisk University in 1933 and Meharry Medical College in 1937, is a recent addition to the dental faculty of the School of Dentistry, Meharry Medical College. From 1937 to 1939, Dr. Henry interned at the Guggenheim Dental Clinic. Between 1939 and 1947, he practiced his profession in Trinidad where he participated in community as well as professional activities.

Dr. Henry recently completed postgraduate courses in operative dentistry, dentistry for children and ceramics at the School of Dentistry, University of Michigan.

R. W. Harrison, Jr., Northwestern University Dental School honor graduate, class of 1941, recently made his first official visit to the Meharry Medical Col-

lege School of Dentistry as visiting associate professor of dentistry. Dr. Harrison, Jr., lives and practices in Yazoo City, Miss.

### U. OF DETROIT OFFERS COURSE IN ADVANCED ORTHODONTICS

The School of Dentistry, University of Detroit, is offering a course in advanced orthodontics in accordance with the teachings of Charles H. Tweed, July 5 to 19. The course covers the clinical and technical application of the Edgewise Arch Mechanism and will be open to those who limit their practice to orthodontics.

Samuel J. Lewis will direct the course. He will be assisted by a faculty consisting of F. Copeland Shelden, Louis Braun, H. D. Kesling, Robert Rocke, Milton Lappin and Robert E. Coleman.

Information and applications may be obtained by writing to Dr. René Rochon, Dean, School of Dentistry, University of Detroit, 630 E. Jefferson Ave., Detroit 26.

### PENNSYLVANIA U. OFFERS COURSE IN DENTAL HYGIENE AND HEALTH

A one week program for graduate dental hygienists and dental teachers beginning June 7 will be offered by the Oral Hygiene Department of the University of Pennsylvania in cooperation with the Departments of Education and Physical Education and the dental departments of the Philadelphia public and parochial schools.

The course will consist of lectures and direct discussions between students and heads of the dental departments of the schools, and in addition, helpful suggestions will be offered on planning an efficient dental program.

The cost of the class, which will be limited in number, is set at $75 a student. Arrangements for living accommodations in the University's dormitory for women may be arranged through Arnold K. Henry, Dean of Student Affairs, University of Pennsylvania. For further information about the course, address inquiries to J. L. T. Appleton, Dean of the Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 4001 Spruce St., Philadelphia 4.

### ILLINOIS ANNOUNCES GRADUATE COURSE IN ORAL SURGERY

The office of the Department of Oral Surgery at the College of Dentistry, University of Illinois, announces a two year, full time graduate course in the basic sciences, with limited clinical experience, carrying credit toward a Master of Science degree. Applications are now being accepted for September 1948.

For further information concerning this graduate course, write to the Graduate Division, College of Dentistry, University of Illinois, 808 S. Wood St., Chicago 12.

## PUBLIC HEALTH

### SOUTHERN BRANCH OF A.P.H.A. FORMS DENTAL HEALTH SECTION

At a recent meeting of the southern branch of the American Public Health Association, a permanent Dental Health Section was established and the following were elected as officers for the ensuing year: Thomas L. Hagan of New Orleans, chairman; Dorothy O'Brien of Nashville, vice-chairman, and Polly Ayers of Birmingham, secretary.

The first program held under the auspices of the Dental Health Section consisted of essays by T. D. Speidel, dean, School of Dentistry, Loyola University, New Orleans; Norman F. Gerrie, senior dental surgeon, U. S. Public

Health Service, Kansas City; Dorothy O'Brien, staff hygienist, Tennessee State Department of Health, Nashville, and S. C. Newitt, director, Division of Administrative Services, Louisiana State Department of Health, New Orleans.

## U.S.P.H.S. PROPOSES NATIONAL TOPICAL FLUORIDE PROGRAM

Local dental societies should be given a voice in determining methods by which topical fluoride treatments would be made available in their own communities, Allen O. Gruebbel, secretary of the Council on Dental Health of the American Dental Association, told a congressional committee during a hearing on a topical fluoride program proposed by the United States Public Health Service.

Appearing before the subcommittee on Public Health and Federal Security of the Appropriations Committee of the House of Representatives, Dr. Gruebbel informed congressmen that topical applications of sodium fluoride for children have been approved and recommended by the Council on Dental Health and the Council on Dental Therapeutics of the American Dental Association. Dr. Gruebbel recommended that administration of the program be decentralized and that all health education material, publicity releases, and other information designed for the public, be screened carefully to prevent the distribution of misinformation.

The Public Health Service has requested an appropriation of $2,680,000 from the Congress to be used as grants-in-aid to states to stimulate the topical fluoride program. The request for funds was broken down as follows:

$1,000,000 for organizing demonstration field units in each state. Each field unit would consist of one dentist, two dental hygienists and one clerk and would operate in from 4 to 12 geographic areas in the state during the next year.

These field demonstration units would conduct their work in cooperation with the state health department. They would demonstrate the technic of topical fluorides to dentists and to the personnel of local health departments. This program would be similar to the x-ray diagnostic program for controlling tuberculosis currently in operation in many states.

$180,000 for publicity and promotion through local and state professional and public health agencies (radio scripts, news releases and motion pictures).

$1,500,000 for grants-in-aid to enable states to publicize and promote topical fluorides; to employ personnel to give demonstrations and to apply topical fluorides, and to provide advisory and supervisory services.

At the hearing held April 1 in Washington, D.C., representatives of the Congress of Parents and Teachers, the National Grange, and the State and Territorial Health Officers testified in favor of the program.

## FOUR DENTAL HEALTH PROJECTS ARE UNDER WAY IN TENNESSEE

Four new dental health projects are now under way in the state of Tennessee. The first of these projects, which is under the supervision of the United States Public Health Service, is a research program in the Chattanooga and Hamilton County schools to determine the effect of various fluoride solutions on dental caries. The program is being conducted in cooperation with the state and city-county health departments, the school systems and the dentists.

The Tennessee State Dental Association in cooperation with the Tennessee Department of Public Health will conduct a series of 9 to 12 hour seminars on periodontia in at least eight districts of the state, June 28 to July 23. Donald Kerr of the School of Dentistry, University of Michigan, and Hamilton B. G. Robinson of the College of Dentistry, The Ohio State University, will be the instructors.

The Department of Pediatrics of Meharry Medical College recently integrated dentistry into the health service given to Negro children by opening a three chair dental clinic during the latter part of September 1947.

The College of Dentistry, University of Tennessee, is conducting a postgraduate course in dentistry for children. Several recent graduates began serving as externs at the beginning of the school's winter quarter.

## NEW YORK HEALTH DEPARTMENT SEEKS DENTAL EXTERNS

The Department of Health of New York, N. Y., will have a number of vacancies for dental externs on or about July 1 at a salary of $2,100 a year. These externships afford opportunities for graduate training in dental public health theory and practice. The duties include clinical work for children under the direct instruction and supervision of a senior dentist.

To qualify for the positions a dentist must be (1) a graduate from a class "A" school, qualified to take the New York State Dental Board examination, (2) a resident of the city of New York for the past three years (official residence is maintained while attending school) and (3) recommended by the dean of the dental school.

Appointments will be made for one year only. Applicants for these positions will gain experience for the civil service examination of dentist which is held from time to time. Anyone interested should make application through the dean of the dental school from which he graduated.

## U. S. P. H. S. HAS COLOR FILM ON "TOPICAL FLUORIDES" FOR LOAN

The United States Public Health Service has available for loan a 16 mm. silent motion picture in color entitled "Topical Fluorides," which depicts the technic of application of sodium fluoride to children's teeth. This film, which has a running time of ten minutes, may be obtained by writing to the District Director, U. S. Public Health Service in the headquarters city nearest your mailing address. Borrowers of the film pay return transportation costs only.

U. S. Public Health Service district headquarters are located in New York, Richmond, Va., Chicago, New Orleans, Kansas City, Mo., Denver and San Francisco.

For further information write to the Dental Public Health Section, States Relations Division, U. S. Public Health Service, Washington, D. C.

## RECENT ACTIVITIES OF ILLINOIS PUBLIC HEALTH DENTISTRY

***Two Dentists Join Illinois Division of Public Health Dentistry.***—Elmer P. Victor and Robert M. Booth recently joined the staff of the Division of Public Health Dentistry of the Illinois Department of Public Health. Dr. Victor, a graduate of the College of Dentistry, University of Illinois, has had three years of special training in dentistry for children. Dr. Booth is a graduate of the School of Dentistry, Loyola University in New Orleans.

***Illinois Appoints Three X-ray Technicians.***—James A. Andrew, Robert F. Jagitsch and Charles C. Macnamara, x-ray technicians of Springfield, Ill., have been employed by the Division of Public Health Dentistry to aid in carrying out the industrial and bitewing roentgenography programs of the department.

***Peoria Adds Staff Member.***—Alex J. Sarron, a recent graduate of the Chicago College of Dental Surgery, Loyola University, has been added to the staff of the Peoria County health department. He will operate a mobile dental unit as

well as direct the dental program of that county.

***Illinois Dental Division Distributes Newsletter.***—The first issue of *The Flyer*, a monthly newsletter distributed by the Division of Public Health Dentistry of the Illinois Department of Public Health, was published in January 1948.

The purpose of *The Flyer* is "to keep the dental profession informed of public health dental activities and to keep them posted on current dental happenings in Illinois as they are observed by the Division of Public Health Dentistry and the Illinois State Council on Dental Health."

## TWO GROUPS SPONSOR MEETING ON PUBLIC HEALTH DENTISTRY

A conference on Preventive and Public Health Dentistry, sponsored by the School of Dentistry, University of Pittsburgh and the Odontological Society of Western Pennsylvania, was held on April 29 at the Mellon Institute auditorium in Pittsburgh.

Speakers at the conference included C. Glen King, Francis A. Arnold, Jr., Allen O. Gruebbel, Louisa J. Eskridge, Isaac Sissman, Walter Weisz, Herbert E. Longenecker, M. E. Nicholson, L. G. Grace, Herbert K. Cooper, Glenna G. Walter, Ida Mae Stilley, Gerald J. Cox and L. E. Van Kirk.

# ARMY AND NAVY

## CONGRESSMAN RIVERS REPORTS ON NEW NAVY DENTAL REGULATIONS

The latest revisions of Navy Regulations, approved by acting Secretary of the Navy, John Nicholas Brown, provide for the retention of dental departments in ships and conform with instructions promulgated by ALNAV 343, June 27, 1946 pursuant to Public Law 284 which was passed by the Seventy-Ninth Congress.

Congressman L. Mendel Rivers, author of Public Law 284, reports that these regulations accomplish the administrative organization of dental departments in ships for which the law was designed.

Section 4 of Public Law 284 is as follows:

The Secretary of the Navy shall provide by regulations for establishing on ships and on shore stations dental services to be under the senior dental officer who shall be responsible to the commanding officer of such ship or shore station for all professional, technical, and administrative matters in connection therewith: Provided, That this section shall not be construed to impose any administrative requirements which would interfere with the proper functioning of battle organizations.

Regulation ALNAV 343 is as follows:

Pursuant Public Law 284, approved 28 December 1945, the following directive is effective as of 28 June 1946.

A Dental Division hereby established in BuMed to plan and direct all matters relating directly to dentistry. Where dental services are or shall be established on ships and on shore stations, such services shall be under the senior dental officer who shall be responsible directly to the commanding officer thereof for all professional technical and administrative matters in connection therewith. Administrative action taken pursuant foregoing shall be such as not to interfere with proper functioning of battle organizations. Dental reports and other communications shall be forwarded to BuMed or other higher authority via the commanding officer. The care and treatment of all dental conditions shall be directly under the control of the senior dental officer, who shall be responsible to the commanding officer. For medical assistance in unusual and emergency situations and for organization and training for battle, dental personnel and equipment shall be under the command and control of the dental officer when so assigned by the commanding officer or as provided in battle and emergency bills. Logistics shall be provided under established procedure until such time as further directives and instruc-

tions are issued. Senior medical officers of all ships and stations shall transfer to senior dental officers of NavSandA 127 dental equipment supplies and such medical supplies as may be necessary. Supplies and equipment other than that under cognizance BuMed required for the operation and maintenance of the dental department shall be issued to the senior dental officer by appropriate custody or issue voucher.

## ARMY OFFERS INTERNSHIPS TO FIFTY RECENT GRADUATES

Fifty dental internships of one year each will be offered by the Army in 1948, to be filled by recent dental school graduates. The internships will be rotating and will include the following services: roentgenology and oral diagnosis, operative dentistry, oral surgery, periodontia and prosthetic dentistry.

Dental interns must be citizens of the United States, graduates of approved dental schools, under 30 years of age on July 1, 1947, must have made no agreement to accept an internship appointment in any other institution, and must meet the physical standards for appointment in the Dental Corps of the Regular Army.

Interns will be appointed as first lieutenants and the pay scales will be in accordance with existing regulations covering commissioned officers' pay and allowances.

## OMIT EXTENSIVE PROFESSIONAL EXAMS FOR NAVY DENTAL CORPS

Candidates for appointment as lieutenant (j.g.) in the U.S. Navy Dental Corps are no longer required to present themselves for the extensive professional examinations previously required for appointment.

Professional examination now consists of a review of transcripts of scholastic records and other credentials by a board of dental officers in the Navy Department. Candidates are not required to be present for this review.

The following are eligible for application for commission in the Dental Corps: citizens of the United States between the ages of 21 and 32 who possess a degree in dentistry conferred by an accredited dental school and who meet the physical requirements; civilian dentists and inactive naval reserve dental officers who received their appointments subsequent to December 31, 1946, and naval reserve dental officers on active duty who received their appointments subsequent to December 31, 1946, and now wish to be appointed to the regular Navy Dental Corps. Naval reserve dental officers (active or inactive) who received their appointments on or prior to December 31, 1946, and who desire entry into the regular Navy Dental Corps should make application for transfer.

For further information, those interested should contact their nearest Office of Naval Officer Procurement.

## NEW DENTAL TECHNICIAN SCHOOL IS ESTABLISHED AT GREAT LAKES

The U. S. Naval Dental Technicians School was established on January 21 at the Great Lakes Naval Training Center. This is the first dental technicians' school to be established by order of the Secretary of the Navy as a separate activity. Capt. Curtiss W. Schantz, DC, who is head of the Dental Department at Great Lakes Naval Training Center, will be the first officer in charge of the new school.

Men who enter this school will be prepared for the recently established rate of Dental Technician which became effective April 2, 1948. The curriculum at the Great Lakes school will include dental, clerical and administrative procedures, general dental operating room duties, dental prosthetic laboratory procedures and the repair of dental equipment.

The U. S. Naval Dental School, National Naval Medical Center, Bethesda, Md., also prepares men for the rating of Dental Technician.

## ARMY TO ANNOUNCE ITS POLICY ON RELEASE OF DENTAL OFFICERS

By June 1, the Army will decide whether A.S.T.P. trained dentists will be released at the end of two years of active service, as originally promised, according to an announcement by Col. Paul I. Robinson, personnel division chief of the Army Medical Corps.

Unofficially, high officers of both the Army and Navy have indicated that all A.S.T.P. and V-12 trained officers will probably be released at the end of two years of active service provided "no unforeseen emergency develops." This has resulted in widespread rumors that dental, medical and veterinary officers would be "frozen" in the services because of the present threatened national emergency. According to Col. Robinson, no decision has been made on this point other than a directive of April 15 which rescinded the former Army policy releasing dental officers before the end of the two year period if they had accrued leave to their credit.

The promised Army directive will be published in THE JOURNAL as soon as it is received.

## NAVY SEEKS CIVILIAN DENTISTS FOR PACIFIC POSTS

The U.S. Navy is assisting the national government in procuring six civilian dentists for practice in the Trust Territory, Pacific Islands. The positions are for Dentist, Civil Service Classification P-4, with a yearly salary of $6,127.50. The locations for practice are Kwajalein and Majuro in the Marshall Island Group and Ponape, Truk, Yap and Koror in the Caroline Island Group.

Applicants should procure Federal Employment Form 57 from any first or second class post office. This form, together with letters of recommendation or references, and satisfactory evidence of graduation from a recognized dental school or college, should be sent to the District Dental Office, 12th Naval District, 50 Fell St., San Francisco 2.

## RESERVE ARMY DENTISTS ARE ELIGIBLE FOR PAY BONUS

Reserve dental officers who sign up for active duty of one year or more are eligible for the $100 a month salary bonus voted officers of the regular corps. This was explained by the Army department in answer to a number of inquiries regarding operation of the salary bonus bill adopted by Congress last year.

A.S.T.P. and V-12 trained officers are not eligible for the salary bonus until they have completed two years of active duty, nor are interns eligible. The bonus is paid to all other dental officers who volunteer for a period of active duty of one year or more. Officers serving for a lesser period of time are not eligible for the extra salary.

## PRESIDENT APPOINTS RENFROW ASSISTANT MILITARY AIDE

Col. Louis H. Renfrow, DC, recently was appointed assistant military aide to the President of the United States, and assistant coordinator of Veterans Affairs. These positions are in addition to his other duties as chief legislative officer of the Office of Selective Service Records.

Since he was commissioned as a first lieutenant in the Dental Corps in August 1917, Col. Renfrow has maintained an active interest in military affairs. Between 1919 and 1941, Col. Renfrow practiced dentistry privately and held a reserve commission in the Army Dental

Corps. During peacetime, he participated in the training program of the Army.

In 1941, he was ordered to Washington for assignment to the Selective Service System on the staff of Maj. Gen. Lewis B. Hershey.

### NEW ATLAS OF DENTAL AND ORAL PATHOLOGY NOW AVAILABLE

The fourth edition of the *Atlas of Dental and Oral Pathology* has just been published by the American Registry of Pathology. It contains 230 pages and 484 illustrations and was prepared at the Army Institute of Pathology from material in the Registry of Dental and Oral Pathology of the American Dental Association.

The authors, Lt. Col. Joseph L. Bernier and Col. James E. Ash, have completely rewritten the text used in previous editions, replaced most of the illustrations with more suitable ones and revised the presentation of the material so that in many respects this latest edition is a completely new publication.

Copies of the *Atlas*, which sells for $7, may be obtained from the Registry Office, Army Medical Museum, Washington 25, D. C.

## GENERAL NEWS

### NATION'S DENTISTS, PHYSICIANS FACE SPECIAL MILITARY DRAFT

Dentists and physicians may face a special draft under the military manpower legislation being readied at the Pentagon (War Department) for Congress. The demand and need for medical men may be so great that dentists and physicians up to the age of 45 and those with dependents may be included in the preparedness program. Veterans, however, might be exempt, regardless of age.

The immediate needs of the Army and Navy medical departments probably can be met largely out of some eight to nine thousand civilian physicians and dentists in their twenties whose professional education was paid for in part by the Government and who as yet have given no service in return. It is estimated that there are 2,600 ex-Army Special Training Program civilian dentists and several hundred ex-V-12 (Navy) civilian dentists who were deferred from military service in order to complete their dental education.

Congress already has been asked to provide an added $3,375,000,000 for the year beginning July 1 to pay for more men and equipment. At the present time, the authorized strength of the Army is 669,000; actual troop strength is only 550,000. The Army wants to build up to a level of 782,000 men.

The authorized strength of the Air Force is 401,000 and actual strength is 360,000. The Air Force is asking for an average of 453,000 airmen by mid-1949.

The Navy is authorized by Congress to have 552,000 men now. Actually there are 392,000 men on duty and the Navy plans to build up its strength to 455,000.

### WASHINGTON, D.C. HOSPITAL SEEKS DENTIST FOR INTERNSHIP

In an announcement recently released by Harold N. Greenberg, chief, Dental Service, The Children's Hospital, Washington, D. C., it was stated that applications for one year of dental internship are now being accepted by the Children's Hospital of Washington, D. C. This internship is full time and provides training in general pedodontics, oral surgery, general anesthesia and orthodontic consultation. Applicants must be recent graduates of class A dental schools. Internship starts July 1, 1948.

# INTERNATIONAL CORRESPONDENCE

## News From Great Britain

The average British practitioner views the future with some concern. On July 5 the National Health Insurance scheme will be replaced by the National Health Service, and all British citizens will be entitled to free dental treatment. The British Dental Association has advised its members not to enter this Service until the act and its regulations have been amended satisfactorily. The average dentist obtains at least 50 per cent of his income from the National Health Insurance scheme. Therefore, if he follows the advice of the B.D.A. he is faced with a considerable reduction of income unless the act is amended before July 5.

### B.D.A. Poll

The Representative Board of the British Dental Association has passed resolutions calling on members to refuse to enter the Service because the Minister of Health has rejected the proposals which the governing bodies of the three dental associations considered essential for a satisfactory dental service. These are (1) acceptance by the patient of complete treatment, (2) complete clinical freedom for the dentist and (3) remuneration by means of grants-in-aid.

The sixteen branches of the Association held meetings to discuss and vote on the Board's action. Reports from ten of the meetings indicate that 97 per cent of those who voted supported the policy. However, only 1,258 members voted at the ten meetings, whereas the possible attendance at these meetings was about 4,788, or two thirds of the 7,182 total members of the Association. If the same ratio prevailed at the other six meetings, then only a fourth of the members actually voted to uphold the stand of the Representative Board. These figures are complicated further by the fact that there are 15,266 dentists on the register. Deducting 3,000 of these who may be retired from active practice leaves about 5,000 who are not members of the Association. Thus the 97 per cent who voted in favor of the B.D.A. policy represent only about a sixth of the profession.

### Threats to Unity

As the other two dental societies were party to the recommendations that were submitted to the Minister it was expected that they would follow the lead of the B.D.A. and give similar directions to their members, but so far they have not made a declaration of policy. This is seen as a threat to the previous unity of action. Despite the possible explanation that the regulations have not been published so all members have not had the opportunity to study them, and despite the fact that the Spens Committee has not published its report yet, this silence is causing some anxiety. Dentists have not forgotten the outcome of the dispute concerning scale of fees. After a large majority of them had rejected for two months the Minister's scale of fees, the resistance collapsed when a compromise solution was offered which the B.D.A. rejected but the other two associations accepted. Thus the unity was broken and the resistance was virtually ended. This lack of unity looms large as a cause of the average dentist's anxiety about the present position of his profession.

It is rumored that the fees in the Spens report will be favorable to the dentists. If so, there is a distinct possibility that a number of dentists now opposed to taking part in the Service will be won over, thus weakening the ranks of the Association's supporters. If a large number of the profession follow the advice of the B.D.A. and refuse to enter the Service the Minister may concede the points recommended. If he does so, the result will be great determination on the part of the profession to fulfill Mr. Bevan's hopes that the Health Service will be a model of its kind.

Some say that a compromise can be reached and that the dental profession would abandon its insistence on complete treatment and clinical freedom if the government would agree to grants-in-aid as it has done in the act for Northern Ireland. Others argue that if the profession stands firm so will the government, and the dental part of the Service will carry on as best it can even though it is inadequate to meet the

demands of the people. Few believe that the profession can hold out indefinitely in large numbers and it is estimated that in six months the Service would have sufficient support so that in most districts there would be a dentist willing to work under its provisions. It is difficult to refuse to treat one's patients when there is little to do and not much money coming in.

### Dental Laboratory Technicians

It is rumored also that if the dentists are not willing to enter the Service the dental laboratory technicians will. They are canvassing for support for their requests to be allowed to do prosthetic work. Mr. Bevan told the profession that he did not intend to include auxiliary dental personnel in the Service, but if the dentists do not enter the Service he may consider himself absolved from the pledge. Dentists who enter the Service might be assigned to the surgical and conservative work, and prosthetists might be employed to work under the supervision of qualified dental surgeons after a short period of training. Mr. Bevan might decide to award a large number of scholarships to boys and girls to encourage them to take up dentistry on condition that they agree to enter the Health Service for a number of years after qualifying. This would be only a long term policy but these graduates would form a valuable nucleus to staff health centers which are envisaged to take a prominent part in the scheme later. These are a few of the arguments that are so perplexing to the ordinary dental practitioner.

### The Patient's Attitude

The public is a little confused as to what it is all about. A certain number of patients have little interest in the provisions of the scheme so long as they can get some return for the money that they will have to pay weekly. The three point program of the dental associations has been interpreted unfairly in the press, as meaning that the patient will have no freedom regarding selection of treatment, that the dentists insist on complete freedom to treat patients as they see fit, and that they want a fee from the state and a fee from the patient as well. This is nonsense. Fair minded lay people will admit that a dental health service will not flourish on patients who only want aching teeth removed and refuse to have teeth saved or to accept conservative and prosthetic service.

### Still Hope

Cooperation and goodwill on the part of the profession and the government will be the only midwife adequate to deliver this Service successfully on July 5 after such a toxic pregnancy. There still is hope that this accoucheur may appear, as the B.D.A. has maintained its contact machinery and is willing to meet the Minister at any time that he wishes.—*John Boyes, University of Durham, Newcastle Upon Tyne, England.*

## News From Mexico

### Registration of Dentists and Physicians

The General Professional Board of the Department of Public Education has stipulated the month of June as the last time for registration of professional degrees of graduates. The "prácticos," those who practice medicine and dentistry without a legally recognized professional degree, have until the end of July to register with the Board. Those who fail to register by this date will be liable to legal punishment.

Until 1945, the practice of the medical and dental professions had not been well regulated in Mexico. Physicians and dentists who did not have degrees could practice medicine and dentistry by adding the phrase "without legally recognized degree" to their name plates. In an attempt to combat charlatanism, and in order to guarantee a more efficient health service, the Mexican Congress passed legislation in 1945 regulating the professions.

The economic interests of those practicing dentistry who do not possess a legally recognized degree have been taken into consideration. Dentists who can prove that they have been practicing their profession for at least ten years may continue in practice provisionally, if they are registered with the General Professional Board. Then, after having attended special courses of supplemental education, these "prácticos" may be admitted to the pro-

fession without provision, by special examinations.

The regulation of the professions was a national necessity. At the present time, the Mexican government requires a professional degree awarded or approved by the National University of Mexico for the practice of all professions. With these measures, Mexico is assured of higher standards in dentistry.

### Activities of the Mexican Dental Association

The newly-elected executive committee of the Asociación Dental Mexicana (Mexican Dental Association) consists of the following: Fermín Raygadas, president; Enrique C. Aguilar, president-elect; Roberto Woodward, vice-president; Pedro Villalón, national secretary; Román Lascuráin, foreign secretary, and Rafael Esponda, treasurer.

Weekly conferences, featuring essayists and clinicians, have been organized by the association's new officers. Isador Hirschfeld of New York presented two lectures, "Pyorrhea is Curable" and "Food Impaction," at recent conferences.

The new officers also have improved the official journal, *Revista de la Asociación Dental Mexicana*, now a bimonthly publication.

### Orthodontic Association Elects Officers

New officers of the Mexican Orthodontic Association are: Luis Farill, president; Wilfrido Arias, secretary, and Manuel Valderrama, treasurer. During the past few years the orthodontic association has organized five medical-dental conventions, all of an inter-American character.—*Samuel Fastlicht, Madero 40, Mexico, D.F.*

## News From India

### Dental Associations

Despite the turbulent conditions that exist in India, membership in the All-India Dental Association increased during the last six months of 1947 from 700 to nearly 900. The Madras and Bombay dental societies have been particularly active in securing new members. One new branch society, the Central India Branch, has been established in Indore. Dental society activities in Pakistan have been hampered tremendously because of communal disturbances. The majority of the Pakistan members have come over to the Indian Union, leaving their equipment and property behind. Most of these displaced dentists have taken refuge in Delhi and Bombay.

Thirty-one members of the All-India Dental Association have become affiliated with the American Dental Association for 1948.

### Dental Education

The Indian government granted scholarships for higher training in dentistry abroad to thirteen students. These students were admitted to the United States, as all of the men elected to study there. The government has agreed to grant ten scholarships to dental students in 1948. Five of these students will receive their postgraduate training in the United Kingdom and five in the United States. The deMontmorency College of Dentistry at Lahore is closed temporarily because of insufficient teaching staff. On the request of the Indian Union the Minister of Health has arranged for the students at deMontmorency college to be transferred to the Currimbhoy Dental College in Bombay.

Plans have been developed for the Central Government to open a Dental College in Delhi which would be second to none in the world. However, because of the heavy expense incurred by the government in rehabilitating refugees from Pakistan, it will be impossible to proceed with these plans at present.

The Watumull Foundation, Los Angeles, has granted a two year fellowship to a candidate to be selected by the All-India Dental Association. In addition to paying the successful candidate's tuition, the Watumull Foundation will pay his transportation by steamer from India to the United States and return, plus a monthly allowance of $150 throughout the two years of study. The candidate must give a bond that he will teach for a period of three years in one of the dental colleges designated by the All-India Dental Association on his return; otherwise, he will have to refund the scholarship to the Watumull Foundation.—*N. N. Bery, Honorary General Secretary, All-India Dental Association.*

# BOOK REVIEWS

**Oral Diagnosis and Treatment.** By Samuel Charles Miller, D.D.S., and thirty contributors. Second edition. 903 pages with 574 black and white illustrations and 39 color plates. Index. Price $10. Philadelphia: The Blakiston Company, 1946.

There is no more important phase of dentistry than that of oral diagnosis. It has been pointed out that for years dentistry developed rapidly along lines of mechanical endeavor and that diagnosis and prevention have not kept pace. Today dental colleges are including and stressing rather intensive courses in oral diagnosis to familiarize the student with many pathologic conditions not heretofore considered in dental education as well as methods of arriving at a correct diagnosis.

Dr. Miller and thirty other contributors have attempted to cover all phases of dentistry and various related anomalies from the standpoint of diagnosis, and to a lesser degree from that of treatment. The book is well illustrated by black and white prints as well as colored plates. Owing to variation in preparation by the numerous contributors, some chapters are more complete and concise than others.

The text leads off well with a chapter on the science of oral diagnosis, the importance of a complete oral examination, taking a good history and various aids at the dentist's disposal in arriving at a correct diagnosis. Following are two good chapters on head pain and pain from dental origin. This discussion will prove useful in the differential diagnosis of lesions producing pain.

Next, diseases of the mouth and adnexa as well as periodontal disease in children are described. Diseases, deficiencies and malformations of the lips, tongue, pharynx, palate, jaws and teeth of children are discussed fully.

The chapter on diseases of the oral mucous membranes is complete and well illustrated. It is divided into sections on inflammations, specific infectious diseases, fungus diseases, the exanthems, nevi, lesions of neurogenic origin, skin diseases with mucous membrane lesions, systemic diseases with changes in the oral mucosa and miscellaneous oral conditions.

The section on roentgenographic interpretation is well prepared with adequate prints showing all the common anomalies of teeth and jaws as well as some of the generalized conditions involving bone. Next is a chapter on abnormalities of the temporomandibular joint. Most of the discussion is limited to anatomy, roentgenography and changes brought about by malocclusion, and no mention is made of various pathologic conditions involving the joint. From a diagnostic view the discussion in this section is inadequate.

The following chapter, on surgical conditions of the mouth, also is limited in scope. Minimal discussion is given to surgical preparation of the mouth for dentures and to osteomyelitis, cysts and tumors of bone. Unerupted teeth and fractures are discussed more fully. Among important surgical conditions which are ignored are the treatment of acute soft tissue infections (except for a short paragraph on Ludwig's angina), cleft lip and palate, and oro-antral fistula. There also is no discussion of anesthesia or anesthetic agents.

The chapters on periodontal disease, lesions of the teeth, fixed bridge prosthesis, partial and full denture prosthesis and orthodontics apparently are well written and illustrated. Excellent sections are presented next on tumors of the oral mucous membranes, mouth infections and their relation to systemic disease, diagnosis and treatment of diseases of the salivary glands, oral manifestations of endocrine dysfunctions, and oral and dental diseases of occupational origin. A new chapter on aerodontia or aviation dentistry has been added to this edition. The two final sections, on laboratory tests in oral diagnosis and bacteriology of the oral cavity, are concise and complete.

The text as a whole is well done, with the exceptions mentioned. It would be a valuable addition to any library, institutional or personal. As a textbook for undergraduate students, it should be supplemented by outside reading in order to cover fully the science of oral diagnosis and treatment.—*Lyle F. Aseltine.*

**The American Textbook of Operative Dentistry.** Edited by Arthur B. Gabel, D.D.S., M.A., with contributions by eminent authorities. Eighth edition. 674 pages, with 438 illustrations. Index. Price $11. Philadelphia: Lea and Febiger 1947.

This textbook first appeared under the editor-

ship of Edward C. Kirk in 1897, and from 1920 until the present edition it was edited by Marcus Ward. Ten leaders in their respective fields of dentistry have contributed to the eighth edition under the editorial guidance of Arthur B. Gabel.

Written primarily for the undergraduate student and as a reference work for the practitioner and teacher, this book presents a critical survey of the latest developments and trends in the field of operative dentistry. It is divided into the following ten chapters: "Examination and Diagnosis," by Paul E. Boyle and Kurt H. Thoma: "Dental Caries," by Phillip Jay: "Preventive Function of Operative Dentistry," by Russell W. Bunting: "Mechanical Principles of Operative Dentistry," by Arthur B. Gabel; "Operative Procedure," by Arthur B. Gabel; "Metal Inlays," by Edwin S. Smyd; "Porcelain Inlays," by William D. Vehe; Dentistry for Children," by Walter C. McBride; "Special Operative Materials," by Floyd A. Peyton.

This edition is narrower in scope than its predecessors. The editor has wisely omitted the chapters dealing with root canal therapy, local anesthesia, extraction and surgical procedures, focal infection and orthodontia, probably because these subjects are not usually included in a course in operative dentistry.

In presenting the material on "Examination and Diagnosis," Boyle and Thoma discuss and illustrate the various pathologic conditions which confront the general practitioner of dentistry. In a textbook dealing with operative dentistry, it would seem logical to include these. However, the reviewer is of the opinion that a fuller and better organized treatment than is here in evidence should have been accorded certain conditions more directly related to the field of operative dentistry, such as the pathology of the hard tissues of the teeth and the various methods for making and recording a mouth examination. Jay's historical review of dental caries research appears for the first time in this work. It is a well-presented, concise and readable review, including the recent experimental work on the use of fluorides in the control of caries. This chapter contains much information which is capable of application in dental practice, and the appended bibliography is in itself a contribution to the literature of the subject.

In his discussion of the "Preventive Function of Operative Dentistry," Bunting presents much useful and up-to-date information regarding those measures which tend to decrease the incidence of oral diseases, and regarding the application of operative procedures to arrest the progress of lesions which already have occurred. He also gives careful attention to the duties of the dentist and patient in the prevention and treatment of the diseases of the investing tissues.

In the chapter on mechanical principles, Gabel has endeavored to apply the fundamental principles of engineering to the preparation and restoration of carious teeth. The purpose of this presentation is to develop in the student habits of thinking and analysis which he might apply to practical situations. Although it is true that many restorations fail because of carelessness or a lack of knowledge of fundamental mechanical principles, it is doubtful that such a highly technical discussion should be given so much emphasis. A careful review of this textbook discloses the appalling fact that very little attention has been given to the clinical pathology of caries, a thorough knowledge of which is essential to the understanding of the principles of cavity preparation and to properly planned operative restorations. However, Gabel's chapter on the technical procedures concerning cavity preparation and the manipulation of the various restorative materials is thorough and well presented.

The construction of metal inlays is accorded a separate chapter which is well illustrated and is excellent for its contents and clarity. Smyd gives considerable attention to cavity preparation according to the Black system, together with some suggestions for the use of the modified slice-preparation. The several methods for the making of wax patterns and for the necessary laboratory procedures are presented in an orderly and scientific manner. The author describes a very efficient direct technic, and an unusual indirect technic. As this chapter was written two years ago, it contains only a reference to the use of the hydrocolloid impression materials for making inlays by the indirect method. Recently much progress has been made with this technic, and a discussion of it will receive increasing attention in future writings on the subject.

Dentistry for children has been deservedly treated as a separate chapter by McBride. It is well written and illustrated and contains a great deal of practical information for both

student and practitioner. Here will be found many useful details concerning child management and technics which have been used successfully by a teacher and practitioner who has devoted his full attention to this important subject.

The technic for making porcelain inlays is virtually the same as was presented in the seventh edition. Vehe describes a careful method which in his hands has proved satisfactory.

The treatment of hypersensitive dentin and of discolored teeth, together with a conservative treatment of the dental pulp, appears under the heading of "Special Operative Procedures." Hill is of the belief that before restorations are placed, a germicidal agent should be used in order to maintain the vitality of the pulp. The need for this procedure is questioned by many experienced clinical operators.

Finally, Peyton gives an excellent chapter on the physical properties and uses of the various restorative materials—an important contribution to a work of this kind. The behavior of the various materials is discussed and suggestions are made for their proper manipulation. The appended bibliography is both comprehensive and up-to-date.

This book is well bound and is printed on a gloss-enamel paper which brings out the fine details of its many excellent illustrations. Although this is a work of many collaborators, continuity is reasonably well maintained and discrepancies are no more numerous than one might expect under the circumstances. From the point of view of a teacher, much is still to be said for the unity to be found in a good book by a single author; nevertheless, the present book can be recommended as a reference work for both student and practitioner.—*Arne F. Romnes.*

**History of Medicine: A Correlative Text, Arranged According to Subjects.** By Cecilia C. Mettler, Ph.D. 1,215 pages with 16 illustrations. Index. Price $8.50. Philadelphia: The Blakiston Company, 1947.

A new general history of medicine of such extent and scholarship as Dr. Mettler's book hardly can fail to make an important contribution to the subject. It is remarkable that one who died on attaining only half the allotted span of life should have accomplished so much with such thoroughness.

Cecilia C. Mettler, through her education and teaching experience, was excellently equipped to undertake such a project. After a classical education, which proved valuable in the translation of early Latin medical documents, she studied history from 1931 to 1933 as a graduate student at Cornell University, and received the Doctor of Philosophy degree in 1938. From 1933 to 1937, in various capacities, she studied medicine, and in 1939 she began teaching the history of medicine in the University of Georgia, where she became a full time professor. She died at the close of the year 1943, a few days after completing the manuscript of her book.

The *History of Medicine* is organized on somewhat different principles from those found in the works of medical history with which the reader is familiar, such as Castiglioni's or Garrison's. Instead of following a generally chronologic presentation, Dr. Mettler has partitioned her work into the various aspects or branches of medicine, and attempted to trace the development in each. This plan has resulted in fifteen sections devoted to the history of the following fields: (1) Anatomy and Physiology, to the End of the Middle Ages, (2) Anatomy in the Modern Period, (3) Physiology in the Modern Period, (4) Pharmacology, (5) Pathology and Bacteriology, (6) Physical Diagnosis, (7) Medicine, (8) Neurology and Psychiatry, (9) Venereology, (10) Dermatology, (11) Pediatrics, (12) Surgery, (13) Obstetrics and Gynecology, (14) Ophthalmology, (15) Otology and Rhinolaryngology.

Dr. Mettler's work is intended as a textbook, and her chief idea in using this plan was that the history of each branch of medicine, being dealt with separately, could be presented to the medical student at the time in his course when he was studying that subject. Moreover, rightly believing in what she called the "conceptual" method, Dr. Mettler attempted to give a continuous and coherent account of each aspect.

The reviewer agrees with Dr. Mettler's preference for developing separately the different general aspects of the subject. But in the more subordinate divisions, the author seems not to to have been so successful.

In a subject as vast and detailed as the history of medicine, where progress is irregular and spasmodic, with plenty of backsliding, it is a stupendous task to select the significant material and to arrange it so that the particular trend is apparent. Dr. Mettler has made a noble effort in this direction, but the reader will probably

feel that frequently she has been overwhelmed by the material and has not harmonized the claims of chronology, subject matter and biography.

The dentist who looks for material in his own province will be disappointed. Unlike most of the historians of medicine, Dr. Mettler has not found room for even a paragraph on dentistry. Dental and oral conditions are mentioned occasionally, usually incidentally, but except for a few men such as Eustachius and Hutchinson, those discussed will be unfamiliar to the student of dental history. John Hunter's *Natural History of the Human Teeth* does not come in for mention.

The following may be mentioned as among the few peculiar judgments in the book: "John Hunter, having had no regular medical education, is primarily of importance as a surgeon. He made some anatomic investigations although their originality is not marked." Somewhat inconsistently, therefore, the portrait of John Hunter is chosen to head the section on "Anatomy in the Modern Period." It may be wondered, too, why the topic "Hydrophobia" is placed in the section on Pediatrics.—*George B. Denton.*

**Bone and Bones.** By Joseph P. Weinmann, M. D., and Harry Sicher, M. D. 464 pages, with 289 illustrations. Index. Price $10. St. Louis: C. V. Mosby Company, 1947.

This book represents a successful attempt to unify the present knowledge of bone, which has been derived from diverse fields of investigation, and to reduce this information to fundamental working concepts. Where interpretations of findings are controversial, the working hypothesis is employed effectively.

Part 1 deals with the normal histology and embryology of bone as a tissue and bones as an organ. The important details are presented in a concise and logical manner, a good many minutiae having been deleted for the sake of clarity.

Part 2, "Pathology of Bone and Bones," constitutes about two thirds of the text. The chapters on the developmental and adaptational disturbances of the skeleton are condensed, yet meet the requirements of this book.

The three chapters on the influences of the endocrins, vitamins and minerals on bone and bones are a welcome contribution, since in most texts these topics are mentioned only, or are dealt with at such length that the reader becomes lost in a mass of detail.

Generally accepted concepts of healing of bone are presented in a short chapter of special interest to the surgeon.

The concept of death of bone, resorption, and replacement by new bone, as the sequence of events following injury to bone by whatever agent, is stressed throughout the section on necrosis and inflammation.

A chapter on skeletal tumors considers each tissue of origin with its benign and malignant derivatives. Long discussions of controversial issues are evaded in order to focus on salient features. Excellent photomicrographs emphasize the histologic characteristics of the various lesions.

Paget's disease is discussed in a short final chapter "as an isolated pathologic entity because attempts at classifying it either as a tumor or as an inflammatory disease have not been entirely successful."

The authors are to be commended on their careful attention to the biologic fundamentals of bone and on the concise, unified and balanced presentation of material drawn from so many sources. Anyone wishing to study a topic in more detail will find assistance in the thirty pages of bibliography, arranged according to topic sequence.—*W. C. Hambley.*

# CURRENT LITERATURE

**Use of Penicillin in Dental Infections.** Maynard K. Elburn. U. S. Nav. M. Bull. 48:120, January-February, 1948.

Penicillin by intramuscular injection (20,000 units in 2 cc. of normal saline solution every three hours for forty-eight hours) was used, with warm saline rinses, in various types of soft tissue reactions to bring about a chronic stage so that surgical or operative treatment could be undertaken safely and successfully.

Direct injection of penicillin by means of a dental syringe gave gratifying results within twenty-four to forty-eight hours in cases of pericoronitis, lateral abscess and cellulitis. Sterile water proved less irritating as a medium for penicillin than normal saline solution. Addition of epinephrine hydrochloride 1:5,000 kept the penicillin in the infected region for a longer period of time and increased its bacteriocidal action.

The precaution, oft repeated, of not injecting into an infected area, does not seem to apply to penicillin. Fewer injections and shorter periods of treatment were required with direct than with intramuscular injection. On the average, two direct injections of 100,000 units each, twenty-four hours apart, were used to bring the infection to a chronic stage.

Better results were obtained when penicillin was used during the inflammatory period rather than during a purulent abscessed stage.—*James Springer.*

## Journal of Dental Research
### February 1948

Titles marked with an asterisk are reviewed below.

**The Editor's Viewpoint.**—1.

***Prevention of Dry Sockets.** Harold W. Krogh, George Washington University.—3.

***Acute Vitamin C Deficiency and Periodontal Disease. I. The Periodontal Tissues of the Guinea Pig in Acute Vitamin C Deficiency.** Irving Glickman, Tufts College Dental School.—9.

***Determination of the Approximate Volumes of Medication Used in Endodontic Treatment.** George G. Stewart, University of Pennsylvania.—24.

**The Evanston Dental Caries Study. I. Determination of Fluorine in Foods, Bones, and Teeth.** D. J. Martin, Evanston Health Department.—27.

**Observations on Induced Caries in Rats. VI. Summary Results of Various Modifications of Food and Drinking Water.** F. J. McClure, National Institute of Health.—34.

***A Method for Quantitative Determinations of Microorganisms in Carious and Non-Carious Teeth of the Cotton Rat.** Elizabeth J. Wakeman, J. Knox Smith, William B. Sarles, Paul H. Phillips, and C. A. Elvehjem, University of Wisconsin.—41.

***Enamel Solubility Reducing Effect of Flavored Low Concentration Stannous Fluoride Solution.** G. Van Huysen and Joseph C. Muhler, Indiana University.—46.

***The Effect of Various Inorganic Salts on the Solubility of Calcium Phosphate, Tooth Enamel, and Whole Teeth in Lactic Acid.** James J. Rae and Charles T. Clegg, University of Toronto.—52.

***Changes in the Calcium and Phosphate Concentrations of Saliva and Inorganic Salt Solutions on Shaking With Calcium Phosphate.** James J. Rae and Charles T. Clegg, University of Toronto.—54.

***The Value of the Roentgenograph in the Detection of Carious Lesions.** Virgil D. Cheyne and Eleanor V. Horne, State University of Iowa.—58.

**International Association for Dental Research: Scientific Proceedings of the New York Section, October 30, 1947.** Compiled by Samuel C. Miller.—68.

**Proceedings of the University of Michigan School of Public Health and School of Dentistry Inservice Training Course for the Evaluation of Dental Caries Control Technics.**—70.

**The Inservice Training Program of the School of Public Health.** Henry F. Vaughan, University of Michigan.—70.

***The Critical Appraisal of Dental Caries Research—Its Importance to Progress in Oral Health.** Donald A. Wallace, Council on Dental Therapeutics, American Dental Association.—76.

***Objectives and Organization of the Caries Control Workshop.** Kenneth A. Easlick, University of Michigan.—81.

***The Development, Histology, and Physiology of Enamel and Dentin—Their Significance to the Caries Process.** Samuel W. Chase, Western Reserve University.—87.

**Some Local Factors in the Development of Cavities—Plaques, Acidity, Aciduric Bacteria, Proteolytic**

**Bacteria.** Robert M. Stephan, National Institute of Health.—96.

***Factors in Immunity and Susceptibility to Dental Caries.** Ned B. Williams, University of Pennsylvania.—101.

***The Effect of Systemic Disease on the Caries Process—Pregnancy, Endocrinopathies, Osteomalacia, Emotional Disturbances, and Others.** Hamilton B. G. Robinson, Ohio State University.—113.

**Prevention of Dry Sockets.** Harold W. Krogh.

The incidence of dry socket after consecutive extractions of 773 lower molars and bicuspids, in which tablets containing ½ grain sulfanilamide and ½ grain sulfathiazole were inserted into the sockets, was compared with the incidence of dry socket after extractions of 2,126 similar teeth used as controls. In the control series the incidence of dry socket was 3.1 per cent for erupted teeth and 27.6 per cent for impactions. No dry sockets occurred when sulfonamide tablets were used. Six impactions needed postoperative treatment. One patient developed a mild skin reaction.

**Acute Vitamin C Deficiency and Periodontal Disease. I. The Periodontal Tissues of the Guinea Pig in Acute Vitamin C Deficiency.** Irving Glickman.

Using 25 young adult guinea pigs for a period of thirty-five days, a histologic study was conducted to determine the manner in which changes in the periodontal tissues in acute vitamin C deficiency are related to the initiation and progress of periodontal disease. The following conclusions resulted from the study:

Acute vitamin C deficiency is responsible for destructive changes in the periodontal membrane and alveolar bone in the absence of general inflammation or pocket formation. These changes result in a loss of tooth supporting tissues throughout the jaws which may be described as generalized periodontoclasia or diffuse alveolar atrophy.

Although acute vitamin C deficiency results in edema, collagen degeneration and hemorrhage in the marginal gingivae, it does not initiate or increase the incidence of marginal gingivitis or pocket formation. The occurrence of gingival inflammation and pocket formation associated with destruction of underlying tissues in cases of acute vitamin C deficiency is not attributable to the deficiency alone but indicates the presence of complicating local factors However, when pocket formation occurs in the presence of acute vitamin C deficiency it is of greater depth than when it occurs ordinarily under comparable local conditions.

**Determination of the Approximate Volumes of Medication Used in Endodontic Treatment.** George G. Stewart.

In this study an attempt is made to determine the volumes of medication which can be sealed into a tooth prepared for root canal therapy. In order to do this, the contents of the pulp chambers and root canals of at least 10 specimens of each type of extracted human tooth, except third molars, were removed, and the canals were enlarged. Then mercury, equal in volume to the amount of medication ordinarily sealed into a tooth undergoing endodontic treatment, was placed in the root canals and pulp chamber of the tooth in question. After this was removed and weighed on an analytic balance, the volume was determined. Values ranging from 0.0088 cc., for the mandibular incisor, to 0.0412 cc., for the mandibular first molar, were obtained. From these values, the number of units of an antibiotic that may be sealed into a tooth prepared for root canal therapy can be determined.

**A Method for Quantitative Determinations of Microorganisms in Carious and Non-Carious Teeth of the Cotton Rat.** Elizabeth J. Wakeman, J. Knox Smith, William B. Sarles, Paul H. Phillips, and C. A. Elvehjem.

A method is described for determining the total bacterial count of carious teeth in the cotton rat. Counts made by this method show conclusively that the greater numbers of organisms in carious teeth are located in the deep-fissure lesions and may be determined only by grinding and culturing the entire tooth.

**Enamel Solubility Reducing Effect of Flavored Low Concentration Stannous Fluoride Solution.** G. Van Huysen and Joseph C. Muhler.

This study shows that a flavored stannous fluoride solution of low concentration (1 to 20,000) reduces sharply the solubility in acetic acid of tooth enamel which has been covered with saliva, dried and powdered. At this concentration stannous fluoride has a greater effect

than sodium fluoride in the same concentration. However, stannous fluoride in a 1 to 20,000 solution is not as effective as a 1 to 500 solution of either stannous or sodium fluoride.

**The Effect of Various Inorganic Salts on the Solubility of Calcium Phosphate, Tooth Enamel, and Whole Teeth in Lactic Acid.** James J. Rae and Charles T. Clegg.

An extension of the work previously published (*J. D. Res* 24:235, 1945) indicates that oxalates and fluorides (which form insoluble calcium salts) and soluble lead, barium and silver salts (which form insoluble phosphates) protect teeth from acid decalcification *in vitro*, and reduce the "apparent" insolubility of tooth enamel and tricalcium phosphate in lactic acid solutions.

**Changes in the Calcium and Phosphate Concentrations of Saliva and Inorganic Salt Solutions on Shaking With Calcium Phosphate.** James J. Rae and Charles T. Clegg.

This study was undertaken in an attempt to explain the differences observed by Karshan (*J. D. Res.* 15:383, 1936; 18:395, 1939) in the percentage of calcium and of phosphate removable by powdered tricalcium phosphate from the saliva of caries-free and caries-active persons.

At a pH of 4 to 5, inorganic salt solutions containing 8 mg. per cent calcium and 16 mg. per cent phosphorus, when shaken with calcium phosphate yield solutions in which both the calcium and phosphate concentrations have increased. At a pH of 7 to 8, the solutions produced have a lower calcium and a higher phosphate concentration. Analogous results were obtained with saliva, which has approximately the same concentrations of calcium and phosphate as the solutions used.

These changes in calcium and phosphate concentrations seem to be independent of each other, and not related to the calcium-phosphorus ratio of the calcium phosphate used.

**The Value of the Roentgenograph in the Detection of Carious Lesions.** Virgil D. Cheyne and Eleanor V. Horne.

Roentgenograms were made of the teeth of 429 children in an effort to determine the relative proportions of cavities detectable by bitewing and full-mouth roentgenograms and by clinical inspections.

Detailed and complete clinical examinations were performed prior to the roentgenographic study. Bitewing roentgenograms were made of 329 children divided into three groups. Group 1 comprised children from a state school for feebleminded who were examined leisurely by painstaking clinical methods. Group 2 children, from the same institution, were inspected more hurriedly by the same examiners. No significant difference was found between these groups in the ratio of roentgenographic to clinical findings. Group 3 comprised 101 children from the clinic of the College of Dentistry. Their dental caries rate was approximately twice that of the institution children.

In the three groups combined, an average of 0.71 additional lesions per child was found by use of bitewing roentgenograms. This was 5.1 per cent of the total lesions found.

In another group of 50 boys and 50 girls from the dental clinic who had full-mouth roentgenographic surveys, no significant sex difference in the amount of caries was found. In 22 boys and 22 girls of this group, the roentgenograms disclosed no additional caries. The average number of additional lesions found by the survey was 1.32 per child, or approximately twice that found by means of bitewing roentgenograms. The lesions found by use of full-mouth roentgenograms formed 6.1 per cent of the total for the group.

The mean number of DMF tooth surfaces was not altered by use of either the bitewing or full-mouth films.

**The Clinical Appraisal of Dental Caries Research—Its Importance to Progress in Oral Health.** Donald A. Wallace.

An outline of the paper precedes the text. Twenty-four factors which the author believes should be taken into consideration in the planning and evaluation of research on dental caries are discussed in relation to practical public health problems.

**Objectives and Organization of the Caries Control Workshop.** Kenneth A. Easlick.

To rid dental health literature of empiric statements and to promote scientific treatment by the practicing dentist, the workshop type of examination of research findings seems ideally suited, because it promotes a study sit-

uation for "students" as well as consultants. The principal consultants to be utilized for a dental caries workshop are dental caries research men, statisticians and librarians.

Certain questions logically arise during the evaluation of a research report. Such questions concern the status of the writer, his ability, the setting in which he works, his statements (statistical tests may be applied) and the publication in which his material appears.

Thoroughly to evaluate the information on caries and its control in a workshop situation requires appraisal of at least six areas of the problem: (1) the mechanism of the caries process; (2) relation of systemic conditions to the caries process; (3) the effectiveness of prophylaxis, tooth-brushing, chewing gum, dentifrices, mouthwashes and home hygiene in the control of caries; (4) the utilization of fluorides and silver salts in the control of caries; (5) the relation of vitamin and mineral ingestion to dental caries, and (6) the contribution of different types of diet to caries control.

**The Development, Histology, and Physiology of Enamel and Dentin—Their Significance to the Caries Process.** Samuel W. Chase.

This article is a brief review with author's opinions, of some recently controverted subjects concerning enamel and dentin.

Odontoblasts produce Korff's dentinogenic fibers, are concerned with calcification of dentin, and have solid cytoplasmic processes. Neumann's sheaths are relatively uncalcified predentin. Interglobular dentin and the granular layer favor the spread of caries. Terminal bars of the ameloblasts are not artefacts. Recent observations show that the removal of organic material and water from enamel and the influx of mineral matter are functions of the pulp by way of the dentin. Each enamel prism is formed by one ameloblast and extends from the dentinal to the oral surface. Prism sheaths probably remain longer than the rest of the enamel, but eventually disappear on completion of calcification.

Penetration of stains into completely calcified enamel occurs by way of imperfections, which also favor the spread of caries. These include incremental lines, tufts, lamellae, spindles and granular prisms. Most, if not all, lamellae are cracks permeated by organic matter of oral origin. Renewed attention is directed to the probably bacterially produced pellicle found on the enamel of many teeth and its association with the lamellae and bacterial film.

**Factors in Immunity and Susceptibility to Dental Caries.** Ned B. Williams.

A summary is presented of studies on the possibility of employing lactobacillus vaccines for the purpose of lowering the numbers of lactobacilli in the saliva of persons with caries activity. Control of the lactobacilli in the mouth by this method is based on the supposed action of antibodies in the saliva. Although preliminary studies indicated that increased blood antibodies for lactobacilli were accompanied by low counts of these micro-organisms from saliva, more intensive work showed that such changes in counts were not statistically significant. It also was noted that increased antibody titers were not maintained.

In spite of the negative findings in these studies it still is recognized that some persons exhibit resistance to dental caries which can be explained only on the basis of a possible immunologic principle. It is necessary that further studies be employed to gain added information on this problem.

**The Effect of Systemic Disease on the Caries Process—Pregnancy, Endocrinopathies, Osteomalacia, Emotional Disturbances, and Others.** Hamilton B. G. Robinson.

Caries is a universal disease and, as such, is difficult to correlate with other diseases. For example, persons with diabetes, tuberculosis, endocrinopathies and psychosis can be expected to have caries just as healthy persons do. Heavy radiation therapy of the cervicofacial region leads, in many instances, to rapid tooth destruction, probably because of qualitative and quantitative changes in the saliva. Pregnancy and lactation, per se, are not causes of caries. Modern studies on uncontrolled diabetics are not available, and most reports are on the relation of the treatment, rather than of the disease, to caries. Most careful studies show no causal relation between caries and tuberculosis, general health, infectious diseases, endocrinopathies or psychoses. Nutritional deficiencies of certain types seem to retard decay rather than accelerate it. Heredity may have some relation to caries, but, in man, environmental factors appear to overshadow genetic effects.

## LIST OF DENTAL OFFICERS

## SEPARATED FROM ARMY DENTAL CORPS

THE following list of dental officers separated from the Army Dental Corps does not include rank because such information is no longer furnished by the Surgeon General's Office. Publication will be given to other names as soon as possible.

| | |
|---|---|
| **Alabama** | |
| Lapine | Naftel, Willie K. |
| Mobile | McClinton, Foster M |
| **Arkansas** | |
| Magnolia | Yarbrough, John C. |
| Texarkana | McKinney, Joseph R. |
| **California** | |
| Bakersfield | Kern, Edward A. |
| Los Angeles | Easton, Joseph D. |
| Los Angeles | Garcia, Homer |
| Los Angeles | Lubeck, Jess L. |
| Los Angeles | Lundy, John C. |
| Los Angeles | McLeod, George J. |
| Los Angeles | Tahl, Henry |
| Los Angeles | Zigrang, John T. |
| Oakland | Parker, James F. |
| Oakland | Wolcott, LeRoy O. |
| San Diego | Silveira, Oliver L. |
| San Francisco | Offenbach, Chester H. |
| San Francisco | Wong, Walter |
| Santa Maria | Westmoreland, Winfred W. |
| West Hollywood | Foulk, Alonzo L. |
| West Los Angeles | Neal, Homer S. |
| Woodland | McAnally, Thomas R. |
| **Colorado** | |
| Denver | Ficca, Ernest W. |
| Denver | Westerberg, Clarence E. |
| Grand Junction | Darley, Harry P. |
| Wray | Sisson, David E. |
| **Connecticut** | |
| Bridgeport | Ochman, Henry R. |
| Hartford | Basch, Herbert |
| Hartford | Platt, Max L. |
| New Haven | Sherman, Samuel R. |
| Shelton | Garofalo, Louis R. |
| **District of Columbia** | |
| Washington | Williams, Robert M. |
| **Florida** | |
| Arcadia | Yelvington, John V. |
| Miami Beach | Rose, Erwin J. |
| Orlando | Sharp, Benjamin C. |
| Tampa | Mistretta, Dominic |
| **Georgia** | |
| Atlanta | Adams, Charles R., Jr. |
| Columbus | Yarbrough, Sidney H., Jr. |
| Macon | Yarbrough, John W. |
| **Hawaii** | |
| Honolulu | Luke, Francis F. |
| Wailuku | Goo, Edward H. |
| **Idaho** | |
| Bonners Ferry | White, Robert H. |
| Raymond | Evans, Woodrow E. |
| **Illinois** | |
| Chicago | Baranowski, Leo F. |
| Chicago | Fields, Samuel |
| Chicago | Libman, Isadore H. |
| Chicago | Litman, Irvin W. |
| Chicago | Matousek, Edward J. |
| Chicago | Pope, William T. |
| Chicago | Potocki, Edward R. |
| Chicago | Scott, Harold L. |
| Chicago | Shaewitz, Irving |
| Chicago | Suffka, Edward T. |
| Jacksonville | Bunch, James L. |
| Jacksonville | Young, William B., Jr. |
| Joliet | Stephen, William J. |
| Litchfield | Patton, John M. |
| Mattoon | McMeekan, Thomas E. |
| Moline | Seidel, Julius |
| Mount Prospect | Seidel, Rudolph A. |
| Nashville | Pero, Stanley S. |
| Riverside | McCoy, James C. |
| Shelbyville | White, Walter B. |
| **Indiana** | |
| Delphi | Lucas, Luther C. |
| East Chicago | Redman, Parker |
| Michigan City | Mathews, Edwin C. |
| Richmond | Smith, William E. |
| **Iowa** | |
| Cascade | Frost, Irwin J. |
| Council Bluffs | Brown, Albert N. |
| Corning | Wilson, Oliver E. |
| Marshalltown | Keller, Herschel W. |
| Sigourney | Schiltz, Jon A. |
| Sioux City | Workhoven, Harry N. |
| West Union | Molumby, Matthew J. |
| **Kansas** | |
| Arkansas City | Lyon, Leon R. |
| **Kentucky** | |
| Danville | Ellis, Ralph E. |

| | |
|---|---|
| Louisville | Richardson, Robert L. |
| Mount Vernon | Keeton, Melvin |
| **Louisiana** | |
| Baton Rouge | Jeansonne, Louis O. |
| Natchitoches | Killen, John E. |
| New Orleans | Guidry, Jules C. H. |
| New Orleans | Levy, Stanley S. |
| New Orleans | Sims, Eugene |
| **Maryland** | |
| Baltimore | Beaumont, Melvin C. |
| Baltimore | McDaniels, Edward R., Jr. |
| Baltimore | Seligman, Leon |
| Takoma Park | Drew, Marvin E. |
| Takoma Park | Kelly, Clayton W. |
| **Massachusetts** | |
| Brookline | Levinson, Tobias |
| Fall River | Winick, Alexander |
| Haverhill | Pollack, Malvin M. |
| Newburyport | Sullivan, George A. |
| Pittsfield | Millet, Wilfrid J. |
| Somerville | Binks, Thomas E. |
| Wakefield | Robinson, Maxwell W. |
| West Springfield | Mitchell, Charles F. |
| Woodville | Stewart, John A. |
| Worcester | Sherman, Joseph |
| Worcester | Shipman, Lewis H. |
| **Michigan** | |
| Detroit | Canady, Clinton, Jr. |
| Detroit | Levitt, Harold A. |
| Detroit | LoVerde, Philip J. |
| Kalamazoo | Schoonmaker, Raymond E. |
| White Pigeon | Cleveland, Kenneth G. |
| **Minnesota** | |
| Austin | Rayman, Frederick L. |
| Minneapolis | Morrone, Joseph J. |
| St. Paul | Haedge, Carl |
| St. Paul | Lewis, Robert W. |
| St. Paul | Lyone, Jack M. |
| Wabasha | Schroeder, Tylas R. |
| **Mississippi** | |
| Canton | Smith, William B., Jr. |
| Natchez | Loflin, Oscar T., Jr. |
| **Missouri** | |
| Elmo | McClaren James F. |
| Fredericktown | Whitaker, Richard O. |
| Kansas City | Lyons, Thomas I. |
| Maplewood | Meyer, Wilfred H. |
| St. Louis | Cohen, Maurice L. |
| St. Louis | Link, Andrew J. |
| St. Louis | Schieber, Joseph A. |
| St. Louis | Woelbling, Wilbert G. |
| St. Louis | Wotawa, Edward A. |
| **Montana** | |
| Whitefish | Schroeder, Robert K. |
| **Nebraska** | |
| Burchard | Kavanaugh, Daniel S. |
| Lincoln | Drown, Kenneth E. |
| Omaha | McKenna, Joseph W. |
| **Nevada** | |
| Elko | Martin, John S. |
| **New Hampshire** | |
| Plymouth | Crowell, Edward B. |
| **New Jersey** | |
| Camden | Ragone, Dewey J. |
| Fords | Hodes, Michael M. |
| Hoboken | Ziment, Jack |
| Jersey City | Leibowitz, Henry R. |
| Little Falls | Bleckwehl, William T., Jr. |
| Long Branch | Horn, Maney A. |
| Newark | Horowitz, Morris |
| Newark | Popper, Royal T. |
| Newark | Reisberg, Jerome L. |
| N. Merchantville | Zackon, Paul G. |
| Paterson | Schwartz, Daniel D. |
| Rutherford | Caruso, Victor E. |
| Tenafly | McKay, Warren |
| Wood-Ridge | Young, Isaac V. Jr. |
| **New York** | |
| Albany | Lubin, Louis J. |
| Amityville | Wolpert, Malcolm |
| Astoria | Forrest, Martin A. |
| Auburn | Donahue, John B., Jr. |
| Averne | Zafonte, Albert |
| Bronx | Fusco, Fulvio F. |
| Bronx | Heide, Irwin P. |
| Bronx | Lipshitz, Joseph |
| Bronx | Wicknin, Nathan |
| Brooklyn | Block, Barnard |
| Brooklyn | Bushel, Arthur |
| Brooklyn | Eiges, Theodore |
| Brooklyn | Fisher, William |
| Brooklyn | Gitlin, Samuel |
| Brooklyn | Goodman, Hyman L. |
| Brooklyn | Gross, Arthur |
| Brooklyn | Harnick, Carl |
| Brooklyn | Licht, Sidney E. |
| Brooklyn | Lombardi, Julius D. |
| Brooklyn | Perry, Gabriel J. |
| Brooklyn | Roffman, Benjamin |
| Brooklyn | Ross, Morris D. |
| Brooklyn | Ruben, Mortimer |
| Brooklyn | Rumack, Irving |
| Brooklyn | Schonfeld, Adolph |
| Brooklyn | Shapiro, Lawrence |
| Brooklyn | Shaftel, Sidney |
| Brooklyn | Shapiro, Theodore |
| Brooklyn | Shelton, Raphael |
| Brooklyn | Siegel, Julian A. |
| Brooklyn | Silver, Milton I. |
| Brooklyn | Sofer, Herman |
| Brooklyn | Solomon, Mortimer D. |
| Brooklyn | Spanier, Eugene |
| Brooklyn | Spitz, Adrian N. |
| Brooklyn | Strassberg, Daniel |
| Brooklyn | Volpe, Thomas L. |
| Brooklyn | Wisoff, William |
| Buffalo | Agati, John T. |
| Dobbs Ferry | Frasca, Kenneth J. |
| Flushing | Ross, Richard S. |
| Forest Hills | Senfeld, Matthew M. |
| Great Neck | Luft, Edmund B. |
| Holcomb | McWilliams, Edward P. |

| | |
|---|---|
| Huntington | Kasden, Harold |
| Jamaica | Schiffman, Philip |
| Laurelton | Marks, Edward |
| Mount Vernon | Lorusso, Joseph J., Jr. |
| Mount Vernon | Sloane, Robert B. |
| Naples | Lyon, William T., Jr. |
| New York | Carroad, Simon |
| New York | Clark, Hammond B. C. |
| New York | Fein, Jacob |
| New York | Friedenthal, Aaron L. |
| New York | Gibson, Robert P. |
| New York | Goldberg, Philip |
| New York | Groopman, Seymour |
| New York | Hoenig, Theodore R. |
| New York | Hosch, Kenneth A. |
| New York | Kase, Seymour A. |
| New York | Pruce, Harry B. |
| New York | Salzman, Leonard |
| New York | Shelton, Richard |
| New York | Siciliano, Vincent M. |
| New York | Sloane, Albert |
| New York | Smith, Murray |
| New York | Zauderer, Jacob |
| Richmond Hill | Randel, Victor I. |
| Rochester | Dale, Peter P. |
| Troy | Sherman, Robert F. |
| W. Brighton | Wolfe, John C., Jr. |
| White Plains | Naidich, Solomon R. |

**North Carolina**

| | |
|---|---|
| High Point | Johnson, Numa C., Jr. |
| Kanapolis | Lipe, Edwin W. |
| Monroe | Wilson, Frederick M. |
| Spruce Pine | Woody, Lyle W., Jr. |

**North Dakota**

| | |
|---|---|
| Langdon | Baldwin, Robert W. |

**Ohio**

| | |
|---|---|
| Cincinnati | Wolfe, Dudley A. |
| Cleveland | Cooper, Aubrey H. |
| Cleveland | Kouris, Nicholas P. |
| Columbus | Williams, Charles E. |
| Lakewood | Miller, Irving M. |
| London | Rogers, Neil O. |
| Oak Hill | Keairns, Raymond E. |
| Painesville | Seymour, Shirley S. |
| Salineville | McGonagle, Robert R. |

**Oklahoma**

| | |
|---|---|
| Ada | Smith, William P. |
| Henryetta | Washington, Donald E. |
| Mountain View | Shacklett, Joseph L. |

**Oregon**

| | |
|---|---|
| Eugene | Scobee, Russell V. |
| Portland | Smith, Charles E. |
| Portland | Starbuck, Thomas B. |

**Pennsylvania**

| | |
|---|---|
| Crafton | Worstell, Wilbur G. |
| Factoryville | Reynolds, Kenneth P. |
| Franklin | Smith, Roy A. |
| Glen Lyon | Sergott, Leonard A. |
| Harrisburg | Eby, John K. |
| Mount Lebanon | McNamara, Lawrence B. |
| Philadelphia | DeGiuseppe, Benjamin J. |
| Philadelphia | Lipsius, Martin S. |
| Philadelphia | Maser, Edward J. |
| Philadelphia | Simmerman, Edgar A. |
| Philadelphia | Sklaroff, Jerome H. |
| Philadelphia | Ulitsky, Abe |
| Philadelphia | Young, Clyde B. |
| Philadelphia | Zebooker, Eli P. |
| Pittsburgh | Lichter, David G. |
| Pittsburgh | Reckard, Oscar J. |
| Pittsburgh | Rosenbloom, Lester |
| Pittsburgh | Weil, Ely |
| Port Carbon | Wilkinson, Arthur W. |
| Reading | Silverman, Morton S. |
| Swissvale | Andolina, Nicholas R., Jr. |
| Westfield | Jacobson Milton |
| York | McGinty, Joseph E. |

**South Dakota**

| | |
|---|---|
| Yankton | Wigodsky, Earl B. |

**Tennessee**

| | |
|---|---|
| Cleveland | Granger, Herbert H., Jr. |
| Dresden | Shannon, Richard C. |
| Memphis | McLean, Albert A. |
| Whites Creek | DePierri, Frank H., Jr. |

**Texas**

| | |
|---|---|
| Dallas | Pearce, Charles M., Jr. |
| Galveston | Koehler, Lee S. |
| Henderson | McRimmon, Carl D. |
| Houston | Kahn, Joseph M. |
| Houston | Sharman, George A. |
| Houston | Winston, Jack R. |
| Liberty | Sitton, Alton O. |

**Utah**

| | |
|---|---|
| Ogden | Pack, Lamont A. |
| Salt Lake City | McKinnon, Franklin R. |

**Virginia**

| | |
|---|---|
| North Arlington | Peete, David D. |

**Washington**

| | |
|---|---|
| Seattle | Ziegman, Aaron |
| South Tacoma | Shaw, Donald R. |

**West Virginia**

| | |
|---|---|
| Bluefield | Mingo, Forrest M. |
| Charleston | Clark, Benjamin F. |
| Hastings | Young, Herbert W. |
| McMechen | McMechen, Charles R. |
| Omar | Haydu, Joseph F., Jr. |

**Wisconsin**

| | |
|---|---|
| Beaver Dam | Sturm, Arthur W. |
| Eau Claire | Serum, Melvyn C. |
| Kenosha | Suriano, Ralph |
| Milwaukee | Wigod, Alexander W. |
| Racine | Buckley, Clark H. |
| Spring Green | McCormick, Virgil K. |
| Wausau | Dalnodar, William L. |

# DEATHS

Abt, Edgar L., Weymouth, Mass.; Dental School, Harvard University, 1924; died February 2; aged 50.

Ackerman, Harrison M., Erie, Pa.; Medico-Chirurgical College of Philadelphia, 1912; died March 20; aged 59.

Aldrich, George W., Roseville, Ill.; died March 2; aged 75.

Allen, Fred W., West Newton, Mass.; Dental School, Harvard University, 1897; died February 13; aged 71.

Alling, E. Roy, Kenmore, N. Y.; died February 1; aged 59.

Anderson, John, Prosser, Wash.; School of Dentistry, North Pacific College of Oregon, 1944; died December 21; aged 42.

Atkinson, Lee W., Salem, Ohio; died March 5; aged 73.

Atwater, H. Gale, Los Angeles; Chicago College of Dental Surgery, 1892; died February 15; aged 77.

Ayres, Chauncey P., Highland, N. Y.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1888; died March 26; aged 79.

Baird, T. W., Pullman, Wash.; United States Dental College, 1893; died March 11; aged 78.

Bantz, Robert L., Marshall, Mo.; Chicago College of Dental Surgery, 1904; died February 12; aged 65.

Barker, E. H., Hopkinsville, Ky.; School of Dentistry, Vanderbilt University, 1897; died March 10; aged 73.

Barner, Edwin F., Jersey Shore, Pa.; School of Dentistry, University of Pittsburgh, 1927; died April 5; aged 44.

Barringer, G. R., Nashville, Tenn.; died February 18; aged 64.

Barter, William E., Topeka, Kan.; Dental Department, Marion-Sims College of Medicine, 1897; died March 20; aged 78.

Bartlett, W. D., Palmetto, Fla.; died February 6; aged 70.

Beach, Charles H., Chevy Chase, Md.; School of Dentistry, Vanderbilt University, 1883; died March 6; aged 73.

Beebe, Frank C., Chicago; Dental School, Northwestern University, 1900; died February 11; aged 68.

Benton, Clarence D., Burlington, Iowa; College of Dentistry, University of Minnesota, 1899; died March 22; aged 80.

Benton, Henry A., Knoxville, Tenn.; Atlanta-Southern Dental College, 1918; died March 11; aged 56.

Bernhardt, Henry C., Kirkwood, Mo.; Dental Department, Baltimore Medical College, 1900; died March 29; aged 72.

Bishop, George E., Orlando, Fla.; Dental Department, Homeopathic Hospital College, 1892; died February 4; aged 78.

Black, Robert B., Mt. Lebanon, Pa.; School of Dentistry, University of Pittsburgh, 1912; Died January 17; aged 72.

Blanchard, Faguet A., New Orleans; died February 19; aged 71.

Borecky, Frank H., Ashland, Wis.; Dental School, Marquette University, 1913; died February 21; aged 63.

Bortz, Louis W., Knox, Ind.; College of Dentistry, University of Illinois, 1915; died February 28; aged 55.

Braddock, Henry J., Monroe, La.; School of Dentistry, Loyola University, 1923; died April 7; aged 59.

Bradley, Harold L., Eugene, Ore.; School of Dentistry, North Pacific College of Oregon, 1926; died March 13; aged 51.

Brathwaite, Stanley W., New York; College of Dental and Oral Surgery, 1923; died February 23; aged 62.

Broadwater, Thomas O., Grantsville, Md.; Baltimore College of Dental Surgery of the University of Maryland, 1916; died March 26; aged 56.

Browning, Henry O., Newton, Ill.; died January 30; aged 83.

Bunce, Elmer W., Los Angeles; College of Dentistry, University of Minnesota, 1908; died in January; aged 63.

Campbell, Freeman, Cleveland; College of Dentistry, Ohio Medical University, 1904; died February 5; aged 65.

Campbell, W. W., Seguin, Texas; State Dental College, 1909; died March 2; aged 60.

Cann, J. Albert, Wilmington, Del.; Baltimore College of Dental Surgery of the University of Maryland, 1906; died April 6; aged 66.

Caron, Alexis E., Tiffin, Ohio; College of Dentistry, Ohio Medical University, 1903; died March 22; aged 80.

Chambers, Edward J. C., Amityville, N. Y.; Dental College of the Province of Quebec, 1904; died March 9; aged 75.

Charles, Frederick A., Concord, N. H.; Baltimore College of Dental Surgery, 1892; died March 17; aged 85.

Chester, Horace C., Malden, Mass.; Tufts College Dental School, 1900; died March 24; aged 71.

Clark, Egbert A., Bethesda, Md.; Medico-Chirurgical College of Philadelphia, 1890; died February 10; aged 88.

Cleveland, Fred L., Barrington, R. I.; died February 3; aged 86.

Coggin, Albert G., Lake Linden, Mich.; College of Dental Surgery, University of Michigan, 1900; died January 23.

Coyne, Rudolph, Canton, Ohio; Pennsylvania College of Dental Surgery, 1909; died February 24; aged 62.

Cummings, Edward S., Concord, N. H.; Philadelphia Dental College, 1900; died February 15; aged 69.

Darrone, Leon O., Syracuse, N. Y.; School of Dentistry, University of Pennsylvania, 1911; died December 8.

DeHon, Louis A., Jr., Salisbury, Md.; College of Medicine and School of Dentistry, Tulane University of Louisiana, 1910; died January 19; aged 58.

Ericsson, Joseph O., Philadelphia; School of Dentistry, Temple University, 1926; died January 18; aged 42.

Fagg, Dow M., Los Angeles; Dental School, Northwestern University, 1901; died February 7; aged 76.

Fellers, Hugh L., Greenwood, S. C.; Atlanta Dental College, 1904; died November 17; aged 64.

Fishburn, William A., Portland, Ore.; School of Dentistry, Indiana University, 1899; died February 15; aged 70.

Fleming, Walter W., Detroit; Department of Dental Surgery, Detroit College of Medicine, 1905; died March 1.

Fletcher, Curtis L., Wheeling, W. Va.; Baltimore College of Dental Surgery, 1915; died January 28.

Fulton, Thomas A., Charleston, Ill.; died February 3; aged 68.

Gans, John W., Richmond, Ind.; Indiana Dental College, 1913; died February 17; aged 61.

Garrett, William H., Ontario, Canada; died February 11; aged 85.

Gibson, C. H., Shakopee, Minn.; College of Dentistry, State University of Iowa, 1890; died February 11; aged 78.

Gillett, Alliene H., Interlaken, N. J.; died February 17; aged 92.

Gore, Benjamin L., New Orleans; School of Dentistry, College of Medicine, Tulane University of Louisiana, 1908; died in February.

Gum, Warren W., Los Angeles; College of Dentistry, University of Southern California, 1923; died February 12; aged 55.

Hanna, George F., Detroit; Department of Dental Surgery, Detroit College of Medicine, 1904; died February 10; aged 69.

Harrison, Earl D., Oakland, Calif.; College of Physicians & Surgeons, 1927; died January 14; aged 52.

Holbrook, Harold E., Milwaukee; Chicago College of Dental Surgery, 1905; died December 28; aged 67.

Holder, Harry E., Santa Monica, Calif.; died January 11.

Hole, F. M., Ridgefarm, Ill.; Dental School, Northwestern University, 1896; died December 15; aged 73.

Honey, Samuel W., St. Joseph, Mich.; College of Dental Surgery, University of Michigan, 1897; died February 23; aged 83.

Horton, John P., Dubuque, Iowa; Des Moines College of Dental Surgery, 1905; died January 21; aged 63.

Hughes, Arthur G., Cicero, Ill.; Chicago College of Dental Surgery, 1920; died February 23; aged 52.

Hutchinson, William J., Elizabeth, N. J.; Baltimore College of Dental Surgery, 1917; died December 21; aged 54.

Jung, Emil P., Buffalo; School of Dentistry, University of Buffalo, 1903; died February 5; aged 66.

Kane, James H., Hartford, Conn.; Temple University School of Dentistry, 1903; died February 13.

Keeler, Howard, Des Moines, Iowa; College of Dentistry, University of Iowa, 1898; died January 22; aged 74.

Keeling, Mark L., Lakeland, Fla.; died January 31; aged 60.

Kelly, Frank, Harlan, Ky.; died January 4; aged 65.

Kenefick, A. R., Fresno, Calif.; School of Dentistry, North Pacific College of Oregon, 1923; died December 10; aged 49.

Kershaw, Bert H., Chicago; Dental School, Northwestern University, 1896; died January 29; aged 75.

Kilmore, John A., Mechanicsburg, Pa.; School of Dentistry, University of Pennsylvania, 1895; died January 21; aged 83.

Kloepper, Arthur H., St. Louis; School of Dentistry, St. Louis University, 1926; died January 4; aged 54.

Korff, Robert C., Pratt, Kansas; Western Dental College, 1898; died December 24; aged 71.

Kribbs, Franklin F., Philadelphia; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1895; died December 10; aged 78.

Krieghoff, Neal, Detroit; died January 10; aged 43.

Krotzsch, Gustavus J., Springfield, Ill.; School of Dentistry, Washington University, 1910; died February 23; aged 68.

Kryger, R. G., Neligh, Neb.; died January 5.

Lackey, Warren L., Porterville, Calif.; College of Physicians & Surgeons, 1899; died December 5; aged 70.

LaFlamme, J. Leo, Cambridge, Mass.; died January 21; aged 74.

Leach, John, South Beloit, Ill.; died February 6; aged 74.

Leard, Norman W., Sr., Jersey City, N. J.; died February 8; aged 85.

Lentz, Thomas C., Columbus, Ohio; died February 21; aged 81.

Leonard, Lawrence P., St. Cloud, Minn.; Baltimore College of Dental Surgery, 1888; died February 23; aged 83.

Linane, Francis J., Chicago; College of Dentistry, University of Illinois, 1924; died February 2; aged 50.

Lindsay, Hooker O., Houston, Texas; Atlanta Dental College, 1916; died January 30; aged 53.

Long, Dallas C., Augusta, Ark.; Louisville College of Dentistry of Centre College, 1907; died December 16; aged 63.

Loomis, Frank D., Battle Creek, Mich.; College of Dental Surgery, University of Michigan, 1897; died February 21.

Luse, Rolla N., Warsaw, Ind.; Indiana Dental College, 1909; died January 2; aged 72.

McAfee, Samuel H., New Orleans; Southern Dental College, 1898; died November 19; aged 75.

McCague, David J., Fairfield, Conn.; New York College of Dentistry, 1906; died February 22; aged 78.

McCrum, Thomas B., Kansas City, Mo.; Dental School, Northwestern University, 1901; died January 30; aged 70.

McKibbin, William H., Berwyn, Ill.; died March 5; aged 67.

McLeod, Fred, Marysville, Kansas; Kansas City-Western Dental College, 1923; died in January.

MacGregor, James H., Elizabeth, N. J.; School of Dentistry, University of Pennsylvania, 1901; died February 10.

Mainz, Leonard C., Taunton, Mass.; School of Dentistry and the Baltimore College of Dental Surgery, University of Maryland, 1913; died January 9.

Markham, Perley H., Syracuse, N. Y.; Thomas W. Evans, Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1904; died February 7; aged 70.

Marre, Leo F., University City, Mo.; School of Dentistry, St. Louis University, 1917; died February 12; aged 52.

Martin, George H., Summit, N. J.; School of Dentistry, University of Pennsylvania, 1896; died January 1; aged 64.

Martineau, A. A., Rolla, N. D.; died January 6.

Meehan, John J., Denver; died January 10; aged 65.

Mistr, John Cleveland; School of Dentistry, Western Reserve University, 1899; died December 2; aged 77.

Mongeon, Louis F., N. Smithfield, R. I.; Dental School, Harvard University, 1898; died December 31; aged 73.

Moomey, Mervil L., Decatur, Ill.; College of Dentistry, University of Illinois, 1910; died Januray 29; aged 61.

Moore, Arthur J., Meshoppen, Pa.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1899; died December 4; aged 75.

Morris, Charles O., Bradenton, Fla.; Pennsylvania College of Dental Surgery, 1891; died February 9.

Morss, George L., Buffalo; School of Dentistry, University of Buffalo, 1900; died January 7; aged 80.

Mulford, Thomas T., Columbus, Ohio; Dental School, Northwestern University, 1908; died January 15; aged 80.

Newlin, Frederick F., Paxton, Ill.; died February 22; aged 77.

Noll, Joseph A., Port Jervis, N. Y.; Baltimore College of Dental Surgery, 1890; died December 30; aged 82.

Okabe, Henry Z., Hanapept, Kauai, T. H.; College of Dentistry, University of California, 1930; died February 2; aged 43.

Ostfeld, Simon, St. Louis; School of Dentistry, St. Louis University, 1912; died February 22; aged 62.

Ostrem, E. H., Glendale, Calif., College of Dentistry, University of Iowa; 1924; died December 25; aged 50.

Owens, Nelson A., St. Louis; died January 12; aged 69.

Parrish, Bert R., Battle Creek, Mich.; College of Dental Surgery, University of Michigan, 1903; died January 13; aged 71.

Payan, Z. J., Pawtucket, R. I.; School of Dentistry, Temple University, 1899; died January 7; aged 75.

Pearlstein, Herman N., Philadelphia; School of Dentistry, Temple University, 1926; died December 18; aged 42.

Peters, Sherwood T., St. Joseph, Mo., died December 29; aged 87.

Pilcher, William, Petersburg, Va.; Dental Department, University College of Medicine, 1896; died January 18; aged 76.

Pohland, Herman J., Sheboygan, Wis.; Dental Department, Milwaukee Medical College, 1905; died February 26; aged 73.

Pope, Alexander, Evanston, Ill.; Chicago College of Dental Surgery, 1901; died December 22; aged 70.

# DIRECTORY

### Officers

H. B. Washburn, President.....Lowry Bldg., St. Paul
Clyde E. Minges, President-Elect.....Peoples Bank Bldg., Rocky Mount, N. C.
Philip E. Adams, First Vice-President.....106 Marlborough St., Boston
Fred A. Richmond, Second Vice-President.....Huron Bldg., Kansas City, Kan.
A. M. Smith, Jr., Third Vice-President.....Stovall Bldg., Tampa, Fla.
Harold Hillenbrand, Secretary.....222 E. Superior St., Chicago
R. H. Volland, Treasurer.....First National Bank Bldg., Iowa City

### Board of Trustees

LeRoy M. Ennis, 1950, Third District.....4001 Spruce St., Philadelphia
Harold W. Oppice, 1950, Eighth District.....1002 W. Wilson Ave., Chicago
O. H. Moen, 1950, Ninth District.....Watertown, Wis.
Daniel F. Lynch, 1950, Fourth District.....1678 Primrose Road, N. W., Washington, D. C.
J. E. John, Sr., 1950 Fifth District.....804 Medical Arts Bldg., Roanoke, Va.
J. B. Carr, 1949, Seventh District.....Hume Mansur Bldg., Indianapolis
C. S. Foster, 1949, Tenth District.....Dows Bldg., Cedar Rapids, Iowa
Robert P. Thomas, 1949, Sixth District.....Francis Bldg., Louisville, Ky.
Henry Hicks, 1949, First District.....5 Glen Court, Greenwich, Conn.
William McGill Burns, 1948, Second District.....80 Hanson Place, Brooklyn
Willard Ogle, 1948, Twelfth District.....Medical Arts Bldg., Dallas, Texas
Fred S. Shandley, 1948, Eleventh District.....Medical & Dental Bldg., Seattle
R. C. Dalgleish, 1948, Thirteenth District.....124 State Capitol, Salt Lake City

### Bureaus

**Chemistry:** Donald A. Wallace, Director, and J. Roy Doty, Senior Chemist, 222 E. Superior St., Chicago.

**Library and Indexing Service:** Murrell Wellman, Librarian; Josephine P. Hunt, Associate Librarian, 222 E. Superior St., Chicago.

**Public Information:** Herbert B. Bain, Director, 222 E. Superior St., Chicago.

### Section Chairmen

**Dentistry for Children and Oral Hygiene:** Robert A. Downs, Colorado State Department of Health, State Office Bldg., Denver.

**Full Denture Prosthesis:** Homer Simpson, Medical Arts Bldg., Dallas, Texas.

**Histology, Physiology, Pathology, Bacteriology and Chemistry (Research):** Basil G. Bibby, Eastman Dental Clinic, Rochester, N. Y.

**Hospital Dental Service:** W. Harry Archer, Professional Bldg., Pittsburgh.

**Operative Dentistry, Materia Medica and Therapeutics:** Ernest R. Granger, 149 Prospect Ave., Mt. Vernon, N. Y.

**Orthodontics:** Frank W. Nash, Medical Arts Bldg., Scranton, Pa.

**Partial Denture Prosthesis:** A. O. Klaffenbach, 226 River St., Iowa City.

**Periodontia:** Harold J. Leonard, 745 Fifth Ave., New York.

**Practice Management:** Gaylord J. James, 9400 Euclid Ave., Cleveland.

**Radiology:** L. R. Main, 3556 Caroline St., St. Louis.

### Standing Committees

**American Red Cross:** George A. Coleman, Chm., 15th and Locust Sts., Philadelphia.

**Constitution and Administrative Bylaws:** Percy T. Phillips, Chm., 18 E. 48th St., New York.

**Dental Education:** Wilbert Jackson, Chm., Clinton, N. C.; Harlan H. Horner, Secy., and Shailer Peterson, Director of Educational Measurements, 222 E. Superior St. Chicago.

**Dental Health:** Hugo M. Kulstad, Chm., First National Bank Bldg., Pomona, Calif.; Allen O. Gruebbel, Secy., 222 E. Superior St., Chicago.

**Dental Legislation:** Carl O. Flagstad, Chm., Medical Arts Bldg., Minneapolis.

**Dental Museum:** Henry A. Swanson, Chm., 1726 Eye St., N. W., Washington, D. C.; Joseph L. Bernier, Secy., Army Institute of Pathology, Washington, D. C.

**Dental Therapeutics:** Thomas J. Hill, Chm., Western Reserve University, Cleveland; Donald A. Wallace, Secy., 222 E. Superior St., Chicago.

**Economics:** Leslie M. FitzGerald, Chm., Roshek Bldg., Dubuque, Iowa.
**History:** Harold L. Faggart, Chm., 2120 Pine St., Philadelphia.
**Insurance:** A. D. Weakley, Chm., 1726 Eye St., N. W., Washington, D. C.; Fred A. Richmond, Secy., Huron Bldg., Kansas City, Kan.
**International Relations:** Stanley D. Tylman, Chm., 55 E. Washington St., Chicago.
**Judicial Council:** Ernest G. Sloman, Chm., 344-14th St., San Francisco.
**Library and Indexing Service:** John E. Gurley, Chm., 350 Post St., San Francisco.
**Membership:** Paul W. Zillmann, Chm., 29 Walden Ave., Buffalo; Harold Hillenbrand, Secy., 222 E. Superior St., Chicago.
**Military Affairs:** Robert T. Curren, Chm., Illinois Bldg., Springfield, Ill.
**Motion Pictures:** Cecil C. Connelly, Chm., 4660 Maryland Ave., St. Louis.
**National Board of Dental Examiners:** W. H. Crawford, Chm., School of Dentistry, University of Minnesota, Minneapolis; Gordon L. Teall, Secy., Hiawatha, Kan.
**Nomenclature:** Harry Lyons, Chm., Professional Bldg., Richmond, Va.
**Patents and Honorary Awards:** M. D. K. Bremner, Chm., 173 W. Madison St., Chicago; Frederick C. Baker, Secy., Calumet Bldg., Hammond, Ind.
**Prosthetic Dental Service:** F. W. Herbine, Chm., 230 N. Fifth St., Reading, Pa.; Earl M. Eaton, Secy., American Bldg., Cedar Rapids, Iowa.
**Relief:** Thomas R. Cullen, Chm., 189 W. First St., Oswego, N. Y.; L. H. Jacob, Secy., Jefferson Bldg., Peoria Ill.
**Research:** M. D. Huff, Chm., Medical Arts Bldg., Atlanta, Ga.; Charles B. Hall, Secy., 1835 Eye St. N. W., Washington, D. C.
**Scientific and Health Exhibits:** J. M. Wisan, 222 E. Superior St., Chicago.

### Special Committees

**Dental and Medical Relations:** Louie T. Austin, Chm., Mayo Clinic, Rochester, Minn.
**Horace Wells Centenary:** Eugene M. Clifford, Chm., 57 Pratt St., Hartford, Conn.
**Hospital Dental Service:** W. Harry Archer, Chm., Professional Bldg., Pittsburgh.
**Trade Relations:** Edward J. Jennings, Chm., 126 W. State St., Trenton, N. J.
**War Memorial:** Louis H. Renfrow, Chm., Selective Service, 21st and C Sts., N. W., Washington, D. C.

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
**222 East Superior Street, Chicago 11, Illinois**
WHItehall 6730 Cable Address: ADAECO

**Lon W. Morrey, Editor** **John J. Hollister, Business Manager**

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear, and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association. *Articles* are accepted with the understanding that they have not been published previously and that they are submitted solely to THE JOURNAL. *Advertising:* All products coming within the scope of the Council on Dental Therapeutics of the American Dental Association must be acceptable to the Council in order to be advertised in THE JOURNAL. Subscription is included in the annual membership dues of the American Dental Association. The subscription rate is $7 a year payable in advance for domestic subscriptions and $8 a year for foreign subscriptions. *Notice of change of address* should be received one month before the change is to be effective.

# ANNOUNCEMENTS

## MEETINGS OF STATE SOCIETIES

| State | Date | Place | Secretary | Address |
|---|---|---|---|---|
| Alabama | | | G. W. Matthews | 1922 Tenth Ave., S., Birmingham 5 |
| Arizona | | | B. K. Litt | 68 E. Congress, Tucson |
| Arkansas | | | D. M. Hamm | Clarksville |
| California | | | L. E. Linehan | 450 Sutter St., San Francisco |
| S. California | April 4-6, 1949 | Los Angeles | M. E. Ralston | 903 Crenshaw Bldg., Los Angeles 6 |
| Colorado | June 14-16 | Glenwood Springs | R. A. Downs | 724 Republic Bldg., Denver 2 |
| Connecticut | | | E. S. Arnold | 37 Linnard Rd., W. Hartford |
| Delaware | | | G. Zurkow | 301 Medical Arts Bldg., Wilmington 9 |
| D. of Columbia | | | K. H. Wood | 202-1835 Eye St., N. W., Washington |
| Florida | Dec. 12-15 | Hollywood | J. I. Todd | 433 St. James Bldg., Jacksonville |
| Georgia | Oct. 11-13 | Augusta | J. M. Heard, Jr. | Persons Bldg., Macon |
| Hawaii | Oct. 28-31 | Lihue | J. H. Lawe | P. O. Box 39, Honolulu 10 |
| Idaho | | | R. Sutcliff | Twin Falls |
| Illinois | | | P. W. Clopper | 623 Jefferson Bldg., Peoria 2 |
| Indiana | | | L. E. Ewbank | Kingman |
| Iowa | May 2-4, 1949 | Des Moines | H. L. Wilson | 417 Insley Bldg. Cedar Rapids |
| Kansas | | | F. A. Richmond | 1008 Huron Bldg., Kansas City |
| Kentucky | | | A. B. Coxwell | 1976 Douglas Blvd., Louisville |
| Louisiana | June 1-4, 1949 | New Orleans | J. S. Bernhard | 407 Medical Arts Bldg., Shreveport |
| Maine | June 6-8 | Portland Springs | P. W. Anderson | 32 Deering St., Portland 3 |
| Maryland | | | E. L. Passagno, Jr. | 415 Medical Arts Bldg. Baltimore 1 |
| Massachusetts | | | P. E. Adams | 227 Commonwealth Ave., Boston 16 |
| Michigan | April 11-13, 1949 | Detroit | F. Wertheimer | Michigan Department of Health, Lansing |
| Minnesota | | | C. V. E. Cassel | Lowry Medical Arts Bldg., St. Paul |
| Mississippi | May 31-June 2 | Biloxi | F. C. Sneed | Osyka |
| Missouri | | | C. W. Digges | Exchange National Bank Bldg., Columbia |
| Montana | | | C. S. Renouard | 305 Phoenix Bldg., Butte |
| Nebraska | | | F. A. Pierson | Federal Securities Bldg., Lincoln |
| Nevada | | | L. G. Jacob | 505 Chestnut St., Reno |
| New Hampshire | June 27-29 | Jefferson | F. E. Williams | 814 Elm St., Manchester |
| New Jersey | | | J. G. Carr | 407 Copper St., Camden |
| New Mexico | | | J. S. Eilar | First National Bank Bldg., Albuquerque |
| New York | | | C. A. Wilkie | 1 Hanson Place, Brooklyn |
| North Carolina | | | R. F. Hunt | Rocky Mount |
| North Dakota | | | A. L. Smeby | Northwood |
| Ohio | Nov. 7-10 | Columbus | E. G. Jones | 185 E. State St., Columbus |
| Oklahoma | April 10-13, 1949 | Oklahoma City | F. H. Binkley | Hennessey |
| Oregon | | | W. H. Hurley | 407 Selling Bldg., Portland 5 |
| Panama Canal Zone | | | T. W. Cagle | Box 243, Cocoli |
| Pennsylvania | | | E. R. Aston | 421 Market St., Kingston |
| Puerto Rico | | | E. Capo | 9 Villa St., Ponce |
| Rhode Island | | | A. A. Albert | 84 Broad St., Pawtucket |
| South Carolina | | | J. R. Owings | 201 E. North St., Greenville |
| South Dakota | | | E. W. Elmen | Sioux Falls |
| Tennessee | | | E. J. Justis | Exchange Bldg., Memphis |
| Texas | | | W. Ogle | 313 Medical Arts Bldg., Dallas |
| Utah | | | S. Ballinger | 1001 Tribune-Telegram Bldg., Salt Lake City |
| Vermont | | | J. A. Larrow | Middlebury |
| Virginia | April 11-13, 1949 | Roanoke | J. E. John | 804 Medical Arts Bldg. Roanoke |
| Washington | | | F. J. Dingler | 1502 Medical & Dental Bldg., Seattle 1 |
| West Virginia | | | C. J. Gavelda | Clarksburg |
| Wisconsin | | | R. A. Mason | 964 N. 27th St., Milwaukee |
| Wyoming | June 21-23 | Rock Springs | J. D. McNiff | 208 Grand Ave., Laramie |

## MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

| State | Date | Place | Secretary | Address |
|---|---|---|---|---|
| Alabama | June 14-18 | Birmingham | M. W. Gaillard | Merchants Bank Bldg., Mobile |
| Arkansas | June 21-24 | Little Rock | H. E. Hanna | National Bank of Commerce Bldg., El Dorado |
| California | June 14<br>July 26 | Los Angeles<br>San Francisco | K. I. Nesbitt | Room 307, 507 Polk St., San Francisco 2 |
| Colorado | June 21-25 | Denver | E. G. Netherton | 724 Republic Bldg., Denver 2 |
| Connecticut | June 15-19 | Hartford | C. G. Brooks | 302 State Street, New London |
| Delaware | June 23-25 | Wilmington | P. K. Musselman | Newark |
| D. of Columbia | June 15-19 | Washington | H. A. Swanson | 1726 Eye St., N. W., Washington 6 |
| Florida | June 28-July 3 | Jacksonville | A. W. Kellner | P. O. Box 155, Hollywood |
| Indiana | June 14-17 | Indianapolis | C. A. Frech | Gary National Bank Bldg., Gary |
| Kansas | June 7-10 | Kansas City, Mo. | G. L. Teall | Hiawatha |
| Kentucky | June 21-24 | Louisville | R. I. Todd | Western Union Bldg., Richmond |
| Massachusetts | July 12-14 | Boston | J. C. Wilson | 413N State House, Boston |
| Michigan | June 7-12 | Ann Arbor | J. L. Champagne | 502 David Whitney Bldg., Detroit 26 |
| Mississippi | June 15 | | J. C. Boswell | 508 Lamar Life Bldg., Jackson |
| New Mexico | June 21-24 | Santa Fe | J. J. Clarke, Sr. | Artesia |
| North Carolina | June 28-July 1 | Raleigh | F. O. Alford | 1109 Liberty Life Bldg., Charlotte 2 |
| North Dakota | July 11-15 | Fargo | W. I. Ford | Fargo |
| Oklahoma | June 14 | Oklahoma City | N. D. Griffith | 509 Medical Arts Bldg., Oklahoma City |
| Ohio | June 28-July 3* | Columbus<br>Cleveland | E. D. Lowry | 79 E. State St., Columbus |
| Oregon | June 7-10 | Portland | F. L. Utter | 506 Pioneer Trust Bldg., Salem |
| Pennsylvania | June 10-16† | Philadelphia and Pittsburgh | R. E. V. Miller | Northampton National Bank Bldg., Easton |
| South Carolina | July 8-11 | | E. G. Bumgardner | 1517 Hampton St., Columbia 29 |
| South Dakota | June 20-23 | | R. W. Ellis | Salem |
| Tennessee | June 7-11 | Memphis | J. J. Vaughn | 1005-6 Medical Arts Bldg., Nashville |
| Texas | June 6-11 | Houston | R. T. Weber | 312 Capital National Bank Bldg., Austin |
| Vermont | June 28-30 | Montpelier | F. A. Reid | Windsor |
| Virginia | June 15 | Richmond | J. M. Hughes | 715 Medical Arts Bldg., Richmond 19 |
| West Virginia | June 21-24 | | R. H. Davis | 510-16 Goff Bldg., Clarksburg |
| Wisconsin | June 14-18 | Milwaukee | S. F. Donovan | Tomah |
| Wyoming | June 24 | Rock Springs | W. J. Ryan | 1720 Carey Ave., Cheyenne |

*Dental and dental hygiene examination.
†Written, June 14-16 (dental); June 14-15 (hygienists). Clinical, June 10-12 (dental); June 16 (hygienists).

## OTHER MEETINGS

| Name | Date | City | Secy. or Chm. | Address |
|---|---|---|---|---|
| American Academy of Dental Medicine, Annual Meeting | June 12-13 | New York | W. Greenhut Secy. | 124 East 84th St., New York |
| American Association for the Advancement of Science, Centennial Celebration | Sept. 13-17 | Washington | H. Shapley Chm. Policy Comm. | 1515 Massachusetts Ave., Washington 5 |
| American Association of Dental Schools | June 21-23 | Buffalo | J. E. Buhler Secy. | School of Dentistry, Temple University, Philadelphia 40 |
| American Board of Oral Surgery | Sept. 7-8* | Chicago | L. M. FitzGerald Secy. | 718 Roshek Bldg., Dubuque |
| American Dental Assistants Association | Sept. 13-16 | Chicago | Mary L. Martin | 610 Jefferson Ave., LaPorte, Ind. |

| | | | | |
|---|---|---|---|---|
| **American Dental Association, Eighty-Ninth Annual Meeting** | Sept. 13-17 | Chicago | H. Hillenbrand Secy. | 222 E. Superior St., Chicago 11 |
| **American Dental Hygienists' Association, Twenty-Fifth Annual Meeting** | Sept. 13-17 | Chicago | A. Rebekah Fisk Secy. | 1704 N. Troy St., Arlington, Va. |
| **American Dental Laboratories Association, First Annual Convention** | Sept. 23-26 | Washington | H. A. Herensperger Chm. Program Comm. | 1930 Chestnut St., Philadelphia 3 |
| **American Dental Society of Europe** | July 27-30 | London | K. C. Campbell Secy. | 88 Portland Place, London, W. 1 |
| **American Society of Oral Surgeons, Thirtieth Annual Meeting** | Sept. 9-11 | Chicago | H. Bear Secy. | 1112 E. Clay St., Richmond 19, Va. |
| **Federation Dentaire Internationale, Annual Meeting** | August 3-7 | Dublin, Eire | M. W. Watry Secy. | 35 Rue Souveraigne, Brussels, Belgium |
| **French Association for the Advancement of Science, Dental Section, Twenty-Fifth Annual Meeting** | July | Geneva, Switzerland | R. Sudaka Pres. | 143 Avenue Emile-Zola, Paris 15 |
| **National Convention of Canadian Dentists** | June 20-24 | Quebec | G. Ratte Gen. Chm. | 140 St. John St., Quebec, P. Q. |
| **National Dental Association, Thirty-Fifth Anniversary** | August 9-13 | Newark, N. J. | J. A. Jackson Secy. | Box 197 Charlottesville, Va. |
| **Pacific Coast Dental Conference** | June 12-16 | Salt Lake City | L. O. Halgren Secy. | First National Bank Bldg., Salt Lake City |
| **Trade Union of Hungarian Physicians, Annual Meeting of the Section of Stomatology** | Sept. 4-12 | Budapest, Hungary | J. Kende Secy. | Nador-U. 32, Budapest, V. |
| **University of Pennsylvania Dental Alumni Society, Annual Meeting** | June 10 | Philadelphia | L. Dill Secy. | Thomas W. Evans Museum and Dental Institute, School of Dentistry, University of Pennsylvania, Philadelphia 4 |

*Examinations for certification.

# INDEX TO ADVERTISEMENTS

## June 1948


Abbott Laboratories ..... A-61
American Dental Association ..... A-58, A-62
Austenal Laboratories, Inc. ..... A-7, A-70

Baker & Adamson ..... A-49
Baker & Co., Inc. ..... A-59
Buffalo Dental Manufacturing Co. ..... A-50
Butler, John O., Co. ..... A-65

Castle Co., Wilmot ..... A-60
Caulk & Co., L. D. ..... A-19
Church & Dwight Co., Inc. ..... A-20
Classified Advertising ..... A-52, A-53
Coe Laboratories, Inc. ..... A-55
Commercial Solvents Corporation ..... A-4
Conformal Shoe Co. ..... A-30
Cook-Waite Laboratories, Inc. ..... A-31
Corega Chemical Co. ..... A-51
Crescent Dental Mfg. Co. ..... A-54

Dee Division of Handy and Harman ..... A-1
Dental Perfection Company ..... A-15
Dentists' Supply Co. of New York, The ..... 4th Cov.
Dresch Laboratories, Inc. ..... A-8
Du Pont de Nemours Co., E. I. ..... A-16, A-17
Durallium Products Corp. ..... A-23

Electro Surgical Appliance ..... A-64
Equinox Press, The ..... A-57

FR Corporation ..... A-43

Galleher Company, The ..... A-64
General Electric X-Ray Corp. ..... A-10, A-11
Gomco Surgical Mfg. Corp. ..... A-42

Hanau Engineering Co. ..... A-35
Hotel Reservations (A.D.A.) ..... A-44, A-45

International Nickel, Inc. ..... A-56

Jelenko & Co., J. F. ..... A-39
Johnson & Johnson ..... A-63
Justi & Son, Inc., H. D. ..... A-5

Kerr Mfg. Co. ..... A-36, A-37
Konformax Laboratories ..... A-22

Medical Protective Company ..... A-12
Menda Co. ..... A-28
Merck & Co., Inc. ..... A-68
Midwest Dental Mfg. Co. ..... A-21
Mizzy, Inc. ..... A-47
Mosby Co., C. V. ..... A-48
Moskey & Geiss ..... A-32
Mowrey Co., W. E. ..... A-38
Myerson Tooth Corp. ..... A-26, A-27

National Dairy Products Corp. ..... A-9
Ney Co., J. M. ..... A-29
Novocol Chemical Mfg. Co., Inc. ..... A-34

Pelton & Crane Co. ..... A-14
Pepsodent Co. ..... A-18
Philco Co. ..... A-6
Physicians Casualty & Health Assn. ..... A-38
Premier Dental Products Co. ..... A-54

Ritter Co. Inc. ..... A-2, A-3
Rota-Seat Inc. ..... A-33

Squibb & Sons, E. R. ..... A-69

Ticonium ..... A-40, A-41
Typhoon Air Conditioning ..... A-62

Union Broach Company, Inc. ..... A-30

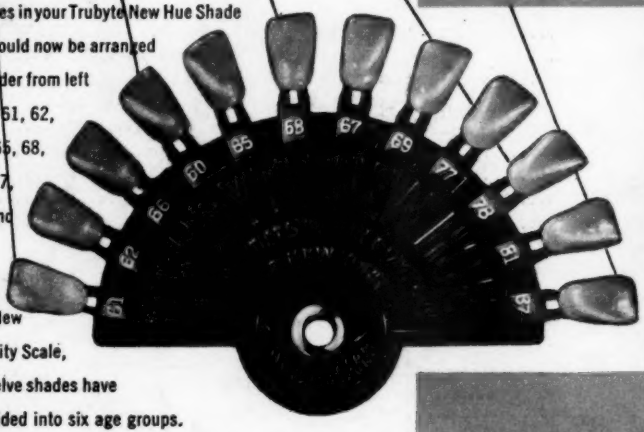
Vernon-Benshoff Co. ..... A-13

Wernet Dental Mfg. Co., Inc. ..... A-66, A-67
White Dental Mfg. Co., The S. S. ..... A-24, A-25

5 new shades

## re-arrange Your Trubyte New Hue Shade Guide

### REMOVE SHADES 85, 63, 73 AND 79




The shades in your Trubyte New Hue Shade Guide should now be arranged in this order from left to right: 61, 62, 66, 60, 65, 68, 67, 69, 77, 78, 81 and 87. In the Trubyte New Hue Vitality Scale, these twelve shades have been divided into six age groups. Each group, except the first, contains at least two shades of increasing saturation within the group.

For patients under 21 consider shade 61. For patients 21 to 30 consider shades 62 and 66. For patients 31 to 45 consider shades 60, 65 and 68. For patients 46 to 60 consider shades 67 and 69. For patients 61 to 70 consider shades 77 and 78. For patients over 70 consider shades 81 and 87.

The five new shades 61, 60, 68, 78 and 87 will, with the popularity of the Trubyte New Hue Vitality Scale, gradually replace shades 85, 65, 73 and 79.

THE NEW HUE VITALITY SCALE

*not just another shade guide*

**THE DENTISTS' SUPPLY CO. OF NEW YORK**

220 WEST 42ND STREET, NEW YORK 18, N. Y.